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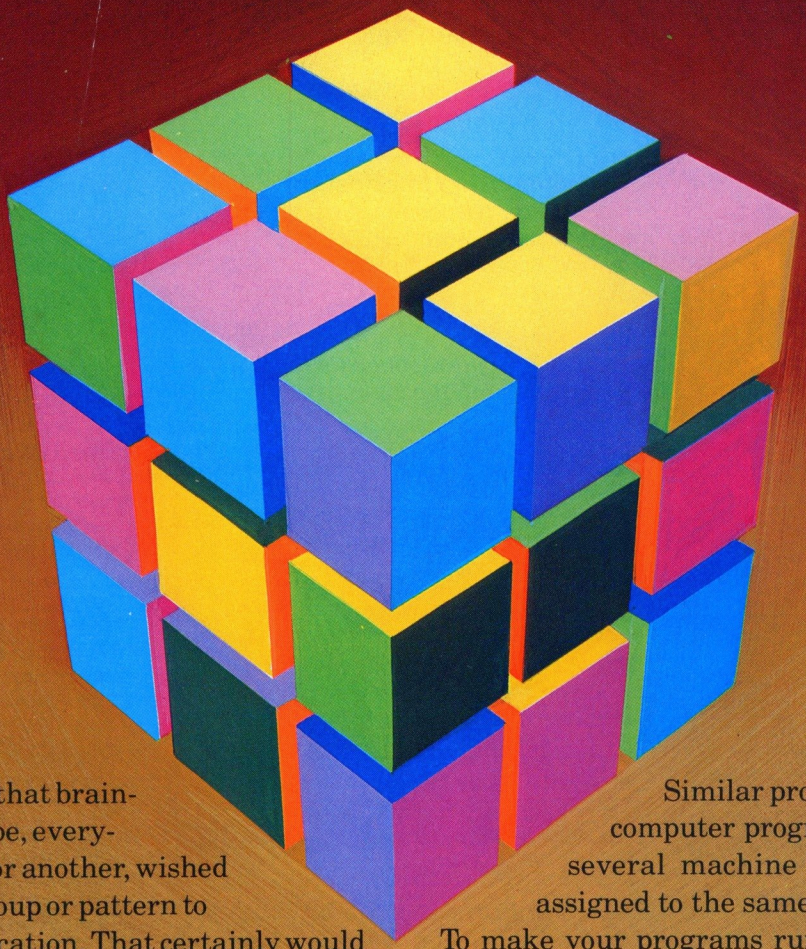

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Call-A.P.P.L.E.™

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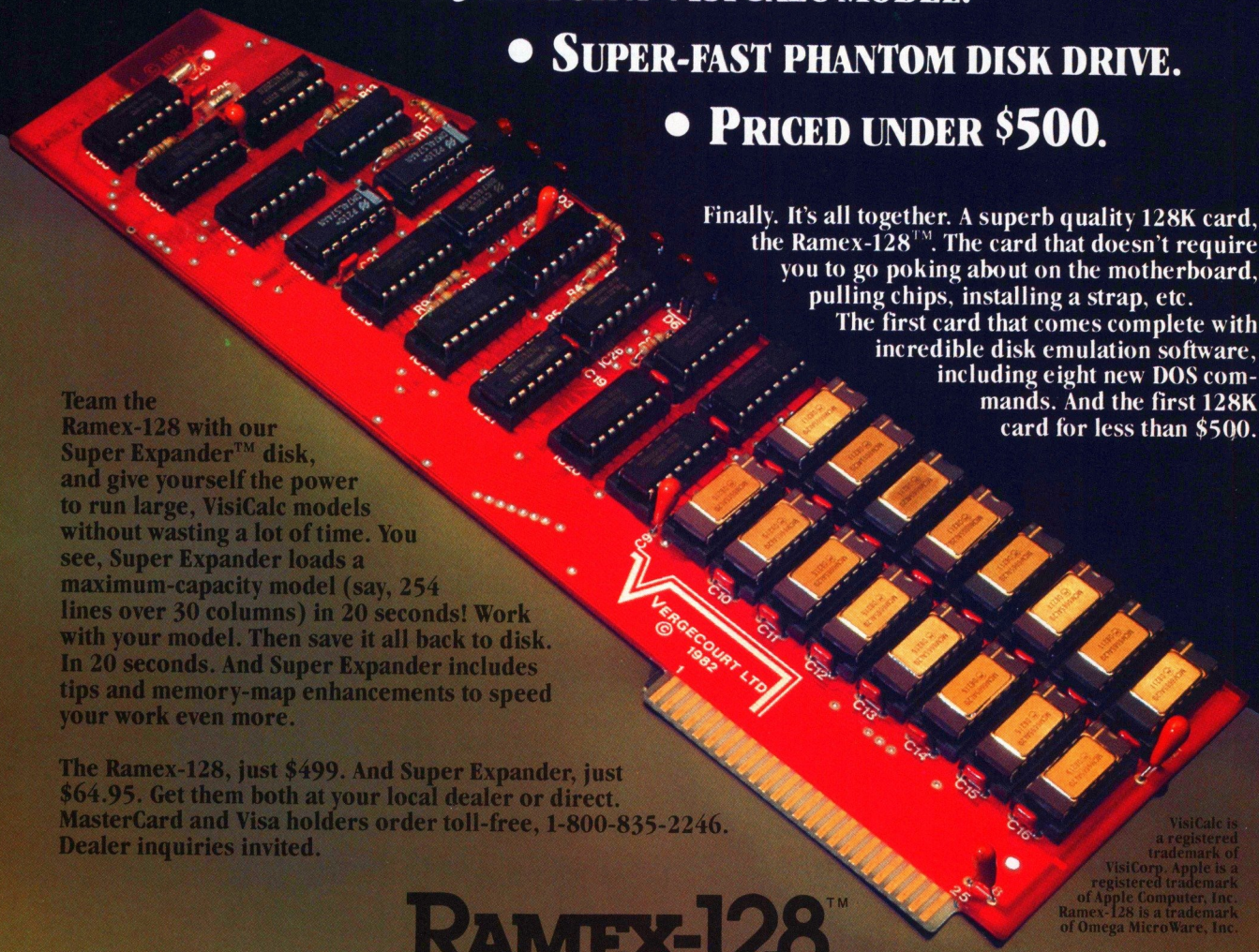

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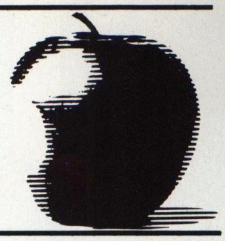

Val J. Golding

BOB DYLAN sings "...the times they are a-changin'..." As with all of his music, there is truth. The profile of the typical Apple user is a-changin'. Originally we were a small, highly technical group of hobbiests whose overall purpose was then, as it is now, to serve our members by providing the latest information and technology, and sophisticated, state-of-the-art programs and documentation.

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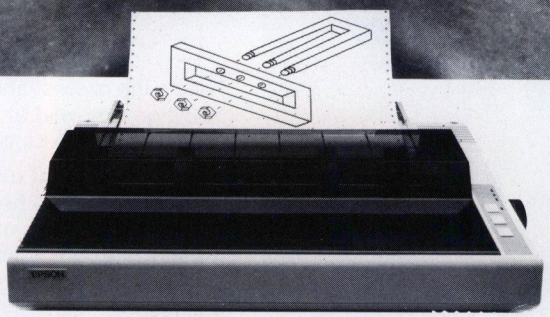

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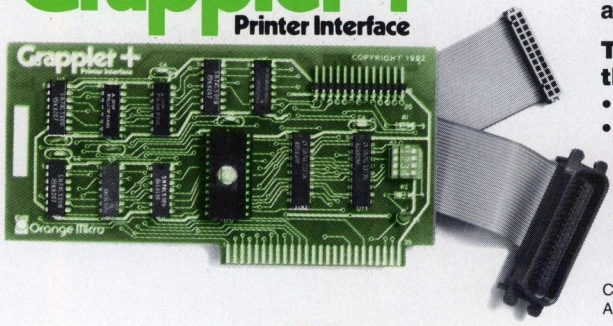

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THE EDITOR BYTES BACK

the editor

INTERNATIONAL is our key word for this issue. Why? 'cause we were sitting around t'other night looking at what we call our "story board", a rough line-up of the forthcoming issue's features, and it dawned on us: four of our authors this time are from overseas.

Staff Writer **Cornelis Bongers** is from The Netherlands, and contributes a new **Call -A.P.P.L.E. Technique: Executing String Expressions,**

Also on our cover, and hailing from England, is **Robert Purves,** a first time author in our pages. If his utility **Text File Fast Loader** is any indication of his talent, he'll be back soon. (And since we know what you don't, he will!)

From South Africa comes **Anthony Rose** with his initial contribution of a short utility to **Expand CHRGET** to run your own assembly programs from Applesoft.

You've probably already enjoyed and put to use some of the neat utilities submitted by **Eric Lambrecht** of Zulte, Belgium; this time his **REMsaver** saves all the REMs from your program before you optimize it.

In issues past, we have seen material from Canada, Australia, New Zealand and other countries. Truly, "today the Apple, tomorrow the world!"

Nelson Capes returns after a long absence with his **Call -A.P.P.L.E. APPLECATION** cover story: **Money Manager,** which does just as its name implies.

Winding up our cover, staff writer **Ralph Swerdlow** brings us another **A IS FOR APPLE,** this time **Printer Protocol** tells how to turn your printer on without disconnecting DOS and similar such goodies.

Last month we started to comment briefly on the never ending process of writing and improving on programs. We have already published two versions of **Free Space,** now comes **Mike Firth** with a truly novel idea for those that have run out of memory space for those short handy utilities. Mike says run it on the screen, and shows how with his version of **Free Space.**

Not to be outdone, we have a new version of **FILEDUMP,** which uses a Ctrl-Q to pause the listing and two Ctrl-Q's to abort it. It will also go to your printer or other peripheral device.

We've moved, sort of. After five years of producing **Call -A.P.P.L.E.** from basements, we have moved into 1100 square feet of modern office space. We'd like our authors and contributors to note the new address: 5606 California Ave. SW, Seattle, WA 98136, and the Editorial Department telephone: (206) 932-8288. Our hours match those of the Renton General Office, Monday through Friday from 8 to 4. As before, only editorial matters should be directed to this department; all other business, membership and orders, etc., continue at General Office.

Concurrently with opening our new office, we would like to "output" the welcome mat to **Kathy Cherry,** who joins **Kathryn Hallgrimson Suther** and ourselves in the Editorial Department. We extend a welcome also to noted author/futurist **Jonathan V. Post**, who has written for **Omni** magazine among others. Jonathan will be a contributing editor for **Call -A.P.P.L.E.,** and in addition to his own material, will be seeking submissions from among his contacts.

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A Call —A.P.P.L.E. TECHNIQUE:

Execute Strings

Cornelis Bongers/Call —A.P.P.L.E. Staff Writer

Introduction

A useful feature that is not included in the Applesoft interpreter, is a command to execute (compound) statements that are inputted by the user during run-time. Attention to this option has already been paid in two previous articles (i.e. Adding Lines to Running Applesoft by David A. Lingwood, *Call —A.P.P.L.E.* Vol IV, Number 1 and Getting the High Sine by Charles Kluepfel, *Call —A.P.P.L.E.* Vol V, Number 4). The programs accompanying these articles were of considerable help in developing the routine presented in figure 1. This routine has two options. First, BASIC (compound) statements that are stored in a string can be added as a line to a running program. The second option is to execute BASIC statements that are stored in a string directly.

If the routine is installed, it can be invoked by inserting the following statement in your program:

line no & EXP string expression

Note that the line number must be specified, for the routine will not work in immediate execution mode (see below). Furthermore, the keyword EXP following the & symbol has nothing to do with the Exponential function, but must be interpreted as "EXecute or Process string" here.

...the program must contain a statement with the...line number.

If the string expression starts with a line number, as in "100 B=3," the & EXP routine will add the line 100 B=3 to the program. *A necessary condition for a successful execution is that the program must (already) contain a statement with the specified line number.* If this is not the case, an UNDEFINED STATEMENT ERROR will be displayed. Furthermore, the statement at the specified line number must be long enough to contain the (compound) statement generated by the EXP routine. If there is not enough room, an OVERFLOW ERROR message will be displayed. If there is room after the expression has been inserted, the rest of the line will be filled with blanks. Two examples are presented in figures 2 and 3.

If no line number is specified in the string, the statements stored in the string will be executed directly. The example in figure 4 illustrates this option.

When developing the option to execute strings directly, I readily met some severe problems. It namely appeared that — due to the internal organization of Applesoft — it is not possible to execute all BASIC commands with the direct option. Implemented are the BASIC commands: LET, PRINT, NOT, IF and THEN, where THEN may not be followed by a line number. As to the functions (SIN, SGN etc.) and the operators (+, - etc.), there are no restrictions.

...it is not possible to execute all BASIC commands in direct...

The fact that only a few BASIC commands can be processed with the direct option is not as severe a limitation as it appears to be at first sight. The primary use of the routine will namely be the execution of numerical (or string) expressions inputted by the user, rather than, for example, changing the flow of the program.

As a possible application, suppose that someone has inputted data regarding age and income in a data information system. If a linear regression program is linked to the DIS, it will be no problem to correlate income and age. However, if a scatter diagram indicates that the relationship between age and income is not linear, the need may arise to transform one or both variables (in order to get an approximate linear relationship). The user may therefore be requested to specify his transformation(s) in the form:

new variable = function (old variable(s))

For example,

LINCOME = LOG (INCOME)

By executing the statement & EXP A$, it can be fed...to Applesoft.

By executing the statement & EXP A$, where A$ contains "LINCOME = LOG (INCOME)," the expression can be fed in directly to Applesoft. Note that it will, in most cases, be necessary to convert the variable to another form as Data is usually stored in an array, rather than in simple variables. For example, if the variable INCOME is stored in column 3 of an array named WC, and LINCOME in column 8, the expression LINCOME=LOG(INCOME) has to be converted to WC(I,8)=LOG (WC(I,3)) before executing & EXP (N.B. The variable I denotes the loop index).

A Call —A.P.P.L.E. QUICKIE:

Hidden in the core of the Applewriter II manual is the information, easy to overlook, that you need to insert control characters in the text, to change character sizes on your printer, etc. [Ctrl-V] is a toggle that turns on and off control character insert mode.

For example, if you wanted to issue the usual sequence of [Ctrl-I] 80N, you would type: [Ctrl-V] [Ctrl-I] [Ctrl-V] 80N. This would turn your video display off and output 80 characters wide to your printer.

EXECUTE STRINGS

How It Works

Next, we will examine in detail how the routine works. The first part (see figure 1, lines 52 to 62), is an initialization routine that sets HIMEM and the top of the stringpool to the value $8C00, which is the starting point of the & EXP routine in memory. It will be clear that setting HIMEM and the top of the stringpool

...setting HIMEM...is necessary...

is necessary, for otherwise Applesoft may use the memory occupied by the routine as dataspace for its strings or variables, which certainly would lead to a crash. The initialization routine also installs the & vector, or more precisely, it sets the & vector at $3F5 to the entry of the main program at $8C17.

On the BRUN EXECUTE STRING command (assuming you give the binary file this name), the initialization routine (not the main program) is executed.

If Applesoft encounters — after the & EXP routine has been installed — an & symbol in your program, it executes a JMP to $3F5. Since at this address the JMP to $8C17 is installed, control will be passed to the main program. The first thing that is done in the main program is a check on the presence of the token for EXP, represented by the hex value $DD (decimal 221, see page 121 of the Applesoft reference manual).This check can be done by simply comparing the value in the Accumulator with $DD, since Applesoft stores the byte following the & token in the Accu before it jumps to $3F5. If the EXP token is present, control is transferred to line 69, else a JMP is executed to the Applesoft error handler, which will generate a SYNTAX ERROR.

...Applesoft accepts the & in immediate...or deferred modes...

Next we must check whether the program is indeed running, for Applesoft also accepts the & symbol in immediate execution mode. It is not possible to invoke the & EXP routine in immediate execution mode, because the program line that is entered and subsequently executed is stored in the input buffer and the input buffer is also used by the & EXP routine (see following). To determine whether the & EXP command is issued in immediate execution mode, the routine ERRDIR can be used. ERRDIR returns control to the & EXP routine if the execution mode is not immediate, otherwise it generates an ILLEGAL DIRECT ERROR.

Now the string expression following the EXP token must be evaluated. Before this can be done, the textpointer at $B8, $B9 has to be incremented by one, as the textpointer still points to the EXP token. The instruction JSR CHNW at line 70 advances the textpointer and the next instruction, i.e. JSR EEXP, evaluates the expression. Since EEXP is a general routine to evaluate expressions, it is necessary to check whether the evaluated expression was indeed a string expression. Furthermore, if EEXPR has allocated temporary storage in the stringpool (which it will do if a string expression rather than a string variable is specified), this room can be freed, because the generated string will be moved to the input buffer.

The FRESTR routine performs both tasks. In addition FRESTR puts the starting position of the string in locations $5E and $5F and it returns with the length of the string in the Accu. The length will be needed later, and is stored in the X and Y register (lines 73 and 74). Also, the length of the string is checked (line 75); if the string has zero length a SYNTAX ERROR will be displayed.

...TEXTPTR will point to the first character behind the string expression.

At this point, the textpointer will point to the first character behind the string expression, which must be a colon, indicating the end of a statement, or a (hex) zero, which indicates the end of a line. Anyway, it is necessary to save the textpointer now, because the CHNW routine is used during the parsing process, and the textpointer will be clobbered. Therefore, the textpointer is saved on the stack by the instructions at lines 76-79.

The next thing that must be done is to move the string to the input buffer (lines 81–85). The reason is that the line still is in ASCII format and hence, cannot be executed by Applesoft. The line has to be parsed first, which means that all keywords have to be replaced by one byte values

Applesoft parses each line entered via the keyboard.

(tokens). Applesoft does this with every line that is entered via the keyboard, so Applesoft's parsing routine expects that the line to be parsed is in the input buffer.

```
      ********************************
2     *                              *
3     * EXECUTE EXPRESSION IN STRING *
4     *      by Cornelis Bongers     *
5     *                              *
6     * Call -A.P.P.L.E. : Sept 1982 *
7     *                              *
      ********************************
9     *
10            ORG   $8C00
11    *
12    * ZERO PAGE ADDRESSES
13    *
14    STR       =     $5E          ;POINTER TO STRING
15    SSTS      =     $6F          ;TOP OF STRING POOL
16    HIM       =     $73          ;HIMEM
17    SARA      =     $9B          ;GENERAL
18    CHNW      =     $B1          ;CHARGET
19    CHOL      =     $B7          ;CHARGOT
20    CKNUM     =     $BA          ;CHECK ON DIGIT
21    *
22    * & VECTOR,INPUT BUFFER,CONSTANTS
23    *
24    BJP       =     $3F5         ;& VECTOR
25    IBUF      =     $200         ;INPUT BUFFER
```

```
                        26    COLON     =     $3A          ;COLON
                        27    EXP       =     221          ;EXP TOKEN
                        28    PLUS      =     200          ;PLUS TOKEN
                        29    IF        =     173          ;IF TOKEN
                        30    THEN      =     196          ;THEN TOKEN
                        31    PRINT     =     186          ;PRINT TOKEN
                        32    NOT       =     198          ;NOT TOKEN
                        33    LET       =     170          ;LET TOKEN
                        34    BLANK     =     $20          ;BLANK
                        35    *
                        36    * APPLESOFT ROUTINES
                        37    *
                        38    PROCES    =     $D533        ;PRE PROCESS LINE
                        39    PARSE     =     $D559        ;PARSE LINE
                        40    FNDLN     =     $D61A        ;FIND LINE NUMBER
                        41    EXEC      =     $D828        ;EXEC PART OF LINE
                        42    UNDEFS    =     $D97C        ;UNDEFINED LINE NUMBER
                        43    UNDEFF    =     $E30E        ;UNDEFINED FUNCTION
                        44    TOHEX     =     $DA0C        ;CONVERT DECIMAL TO HEX
                        45    SYNT      =     $DEC9        ;SYNTAX ERROR
                        46    EEXP      =     $DD7B        ;EVALUATE EXPRESSION
                        47    OVFL      =     $E8D5        ;OVERFLOW ERROR
                        48    ERRDIR    =     $E306        ;CHECK ILL DIR (STOWE KELLER)
                        49    FRESTR    =     $E5FD        ;CHECK STRING/FREE TEMP STRING
                        50    *
                        51    * INITIALIZATION
                        52    *
8C00: A9 00             53    BEGIN     LDA   #BEGIN
8C02: 85 73             54              STA   HIM          ;SET HIMEM
8C04: 85 6F             55              STA   SSTS         ;SET TOP OF STRINGPOOL
8C06: A9 8C             56              LDA   #>BEGIN
8C08: 85 74             57              STA   HIM+1
8C0A: 85 70             58              STA   SSTS+1
8C0C: A9 17             59              LDA   #START
8C0E: 8D F6 03          60              STA   BJP+1        ;SET & VECTOR
8C11: A9 8C             61              LDA   #>START
8C13: 8D F7 03          62              STA   BJP+2
8C16: 60                63              RTS
                        64    *
                        65    * MAIN PROGRAM
                        66    *
8C17: C9 DD             67    START     CMP   #EXP         ;EXP TOKEN ?
8C19: F0 03             68              BEQ   NOS          ;BRANCH IF SO
8C1B: 4C C9 DE          69              JMP   SYNT         ;SYNTAX ERROR IF NOT
8C1E: 20 06 E3          70    NOS       JSR   ERRDIR       ;CHECK EXECUTION MODE
8C21: 20 B1 00          71              JSR   CHNW         ;ADVANCE TEXTPOINTER
8C24: 20 7B DD          72              JSR   EEXP         ;EVALUATE STRING EXPRESSION
8C27: 20 FD E5          73              JSR   FRESTR       ;CHECK STRING/FREE TEMP STRING
8C2A: AA                74              TAX                ;SAVE LENGTH IN X
8C2B: A8                75              TAY
8C2C: F0 5B             76              BEQ   SYN          ;SYNTAX ERROR IF EMPTY STRING
8C2E: A5 B9             77              LDA   CHOL+2       ;SAVE TEXTPOINTER ON STACK
8C30: 48                78              PHA
8C31: A5 B8             79              LDA   CHOL+1
8C33: 48                80              PHA
8C34: C8                81              INY
8C35: 88                82    MOV1      DEY
8C36: B1 5E             83              LDA   (STR),Y      ;MOVE STRING TO INPUT BUFFER
8C38: 99 00 02          84              STA   IBUF,Y
8C3B: 98                85              TYA
8C3C: D0 F7             86              BNE   MOV1
8C3E: 20 33 D5          87              JSR   PROCES       ;PRE PROCESS STRING
8C41: 86 B8             88              STX   CHOL+1       ;SET TEXTPNTR TO INPUT BUFFER
8C43: 84 B9             89              STY   CHOL+2
8C45: 20 B1 00          90              JSR   CHNW
8C48: 90 42             91              BCC   INSERT       ;BRANCH IF DIGIT
8C4A: 20 59 D5          92              JSR   PARSE        ;PARSE STRING
8C4D: A0 FF             93              LDY   #$FF         ;CHECK IF TOKENS ARE ALLOWED
8C4F: C8                94    NOTOK     INY
8C50: B9 00 02          95    OK        LDA   IBUF,Y
8C53: F0 24             96              BEQ   EX1          ;READY IF END OF LINE
8C55: 10 F8             97              BPL   NOTOK        ;BRANCH IF NOT A TOKEN
8C57: C9 C8             98              CMP   #PLUS        ;OPERATOR/FUNCTION TOKEN ?
8C59: B0 F4             99              BCS   NOTOK        ;OK IF SO
8C5B: A2 03            100              LDX   #TABEND-TABLE
8C5D: DD 75 8C         101    COMP      CMP   TABLE,X      ;COMPARE TOKEN WITH TABLE
8C60: F0 ED            102              BEQ   NOTOK
8C62: CA               103              DEX
8C63: 10 F8            104              BPL   COMP
8C65: C9 C4            105              CMP   #THEN        ;THEN ?
```

EXECUTE STRINGS

```
8C67: D0 09      106          BNE  NOTAL          ;ERROR IF NOT
8C69: C8         107          INY
8C6A: B9 00 02   108          LDA  IBUF,Y
8C6D: 20 BA 00   109          JSR  CKNUM          ;NEXT CHAR MAY NOT BE A DIGIT
8C70: B0 DE      110          BCS  OK             ;BRANCH IF NO DIGIT
8C72: 4C 0E E3   111  NOTAL   JMP  UNDEFF         ;UNDEFINED FUNCTION
8C75: BA         112  TABLE   DFB  PRINT          ;TABLE WITH ALLOWED TOKENS
8C76: AA         113          DFB  LET
8C77: C6         114          DFB  NOT
8C78: AD         115  TABEND  DFB  IF
8C79: 20 B1 00   116  EX1     JSR  CHNW           ;ADVANCE TEXTPOINTER
8C7C: 20 28 D8   117          JSR  EXEC           ;EXECUTE TILL : OR EOL
8C7F: A0 00      118          LDY  #$00
8C81: B1 B8      119          LDA  (CHOL+1),Y     ;GET CURRENT CHAR
8C83: F0 3C      120          BEQ  RDY            ;READY IF END OF LINE
8C85: C9 3A      121          CMP  #COLON         ;HERE IT MUST BE A COLON
8C87: F0 F0      122          BEQ  EX1            ;BRANCH IF SO
8C89: 4C C9 DE   123  SYN     JMP  SYNT           ;SYNTAX ERROR IF NOT
8C8C: 20 0C DA   124  INSERT  JSR  TOHEX          ;CONVERT LINE NO TO HEX
8C8F: 20 59 D5   125          JSR  PARSE          ;PARSE INPUT BUFFER
8C92: 20 1A D6   126          JSR  FNDLN          ;FIND LINE NO
8C95: B0 03      127          BCS  NOERR          ;OK IF FOUND
8C97: 4C 7C D9   128          JMP  UNDEFS         ;UNDEFINED STATEMENT
8C9A: A0 00      129  NOERR   LDY  #$00
8C9C: B1 9B      130          LDA  (SARA),Y       ;GET LOW BYTE NEXT LINE
8C9E: 38         131          SEC
8C9F: E5 9B      132          SBC  SARA           ;SUBTRACT LOW BYTE THIS LINE
8CA1: 38         133          SEC
8CA2: E9 04      134          SBC  #$04
8CA4: AA         135          TAX                 ;SAVE LENGTH LINE IN X REGISTER
8CA5: A0 04      136          LDY  #$04
8CA7: B9 FC 01   137  MOV3    LDA  IBUF-$04,Y     ;INSERT INPUT BUFFER IN PROGRAM
8CAA: F0 0B      138          BEQ  RWIB
8CAC: CA         139          DEX
8CAD: F0 05      140          BEQ  OVER
8CAF: 91 9B      141          STA  (SARA),Y
8CB1: C8         142          INY
8CB2: D0 F3      143          BNE  MOV3           ;ALWAYS
8CB4: 4C D5 E8   144  OVER    JMP  OVFL           ;ERROR, IT DOESN'T FIT
8CB7: A9 20      145  RWIB    LDA  #BLANK
8CB9: CA         146  FILL    DEX
8CBA: F0 05      147          BEQ  RDY
8CBC: 91 9B      148          STA  (SARA),Y       ;FILL REST OF LINE WITH BLANKS
8CBE: C8         149          INY
8CBF: D0 F8      150          BNE  FILL           ;ALWAYS
8CC1: 68         151  RDY     PLA
8CC2: 85 B8      152          STA  CHOL+1         ;RESTORE TEXTPOINTER
8CC4: 68         153          PLA
8CC5: 85 B9      154          STA  CHOL+2
8CC7: 60         155          RTS

--End assembly--      200 bytes      Errors: 0
```


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The PROCES call at line 86 pre-processes the string so that it is ready for the parser. PROCES returns with $FF in the X-register and $01 in the Y-register. These values are used to initialize the textpointer to the start—1 (i.e. $1FF) of the input buffer.

Next, we have to determine whether the string must be executed directly or if it has to be added as a line to the program. This can conveniently be done with the CHNW routine. Execution of CHNW namely will load the first character of the string in the Accumulator, but more important here, it returns with a cleared carry if the first character is a digit. If not, the carry is set. If the first character is a digit, it must be the first digit of a line number (a BASIC instruction may not begin with a digit) and in this case a branch is taken to the INSERT routine.

The INSERT routine at line 123 first converts the line number from ASCII to hex. For this purpose, Applesoft's TOHEX routine is used, which reads the line number, converts it to hex and stores it in the zero page locations $50, $51. TOHEX returns with the textpointer pointing to the first character behind the line number. Then the line in the input buffer has to be parsed. The parse routine, which is called at line 124, starts parsing at the character pointed to by the textpointer. The parsed line is also stored in the input buffer, starting at $200. This causes no problems as the parsed line will be shorter than the original line (currently stored in the input buffer) so the part of the line that is not yet parsed cannot be overwritten by the part that is already parsed. The parse routine also inserts a zero at the end of the line.

FNDLN searches the program for the line number stored in $50, $51.

Next, the Applesoft find line (FNDLN) routine is called. FNDLN searches the program for the line number stored in $50, $51. FNDLN returns with the carry clear if the line is not found and, as the listing shows, in that case the message UNDEFINED STATEMENT will be generated. Otherwise, the start of the line in memory is stored in $9B and $9C and control passes to line 128.

Here the length of the program line is calculated. This is done by making use of the fact that the pointer to the next line is stored at the start of the current line. So, the low byte of this pointer can be retrieved by executing the two instructions at lines 128 and 129. By subtracting from this byte the low byte of the current line, the length of the line is obtained (Note that the high byte can be neglected because the length of the line is always smaller than 256). Four bytes must be subtracted from the result, to compensate for the room occupied by the line number and the pointer to the next line.

The (effective) length of the line is then transferred to the X-register and the parsed line in the input buffer is copied in the program (lines 134–142). If there is room left in the Applesoft line, the rest of the line is filled with blanks (lines 144–149). Finally, the textpointer is restored to its original position (lines 150–153) and then the routine returns control to Applesoft.

Next, we will examine the other option of the & EXP routine. If an expression in a string must be executed directly, the call to CHNW at line 89 will return with the carry set. Control will then pass to line 91 where the string previously stored in the input buffer is parsed. Then the line in the input buffer is checked on tokens that are not allowed (lines 92–109). As can be seen, the checking begins at the start of the input buffer and ends when the zero indicating the end of line is encountered (line 95). All bytes that have their high bit off are skipped (line 96), because these cannot be

...all tokens > $C7 correspond to operators...

tokens. Furthermore, all tokens with a value larger than or equal to $C8 (decimal 200) correspond to operators and functions and are therefore also skipped. Only if a byte assumes a value between $80 (decimal 128) and $C7 (decimal 199), it is compared with the allowed tokens in the table, which starts at line 111.

If the byte matches none of these, the checking continues, otherwise the byte is compared with the THEN token (line 104). If it is not equal to the THEN token, the error message UNDEFINED FUNCTION is displayed. In case, it is equal to the THEN token, the next byte must be checked on being non-numerical. A digit following the THEN implies that THEN is used as a substitute for GOTO, and this instruction is not allowed. The check can best be done by making use of the last part of the CHNW routine.

When entering CHNW at $BA, the byte in the Accu will be checked as to whether or not it is a digit. If it is a digit, the carry will be cleared. After executing the JSR CKNUM instruction (line 108), checking is continued if the carry is set, otherwise the & EXP routine exits with the UNDEFINED FUNCTION error.

The next question to be answered is how to get the line executed. To answer this, we have to realize that Applesoft must somewhere contain a main driver that executes lines. By copying this main driver in our routine, it must be possible to execute the line. Applesoft's main driver can be found at $D7D2 to $D823 (see also Applesoft internal structure by C.K. Meszteni, *Call —A.P.P.L.E.*, Vol V, Number 1). The main driver contains a call to the EXECUTE STATEMENT routine at $D828, which executes an Applesoft line up to the first colon or end of line symbol. Furthermore, the main driver checks whether control C has been pressed, when necessary loads the next line number in the current line registers ($75, $76), sets the textpointer to the start of a new line and prints the line number if TRACE is on.

If we strip the main driver of all functions that are not absolutely necessary, the routine at lines 115–121 results. As can be seen, the only check that is done is the check on the presence of a colon or end of line symbol at the end of a statement. If the end of line symbol is encountered, execution of the line is completed and control returns via the RTS instruction at line 154 to Applesoft (after restoring the textpointer).

As I mentioned before, not all statements can be executed in direct mode. The reason is twofold. First, not all Applesoft statements return to the main driver by means of an RTS instruction. Second, due to the fact that we let Applesoft execute a line in the input buffer, while Applesoft thinks it is executing a line in the program, most instructions that transfer control to another part of the program will fail.

—◉→

EXECUTE STRINGS

An example of an instruction that doesn't return control to the main driver is the NEXT instruction. When Applesoft encounters a NEXT, it calls the NEXT handler, which searches the stack for loop information. This messes up the stack and also destroys the NEXT handler's return address. Since no precautions are taken by the NEXT handler to save its own return address, Applesoft's only way to continue execution is to jump back directly to the main driver and this is exactly what happens.

...no precautions are taken by the NEXT handler to save its own return address.

The FOR handler shows a similar behavior. When executing **100 & EXP "FOR I=1 TO 10:PRINT I: NEXT I"** Applesoft takes over control from the & EXP routine when it encounters the FOR. This usually has the effect that the program stops if the loop has been completed, which is clearly not the intention.

In case a GOTO instruction is inserted in the string, a different problem arises. If Applesoft encounters the GOTO, it will first determine whether the specified line number is (approximately) smaller or larger than the current line number (see Amplifying Applesoft by David A. Lingwood, *Call -A.P.P.L.E. in Depth,* Number one). If the line number is smaller, Applesoft starts its search for the line number at the start of the program, otherwise it starts searching from the current line.

However, in the latter case Applesoft runs into trouble, because the textpointer is not pointing to the current program line, but to the input buffer. Therefore, Applesoft calculates a pointer to the end of the line in the input buffer (rather than to the end of a line in the program), where it expects to find the next line. Then the FNDLN routine is called to search for the line number, but this routine will be unable to find the specified line number, as no other lines follow the line in the input buffer.

I have drastically ruled out all problems discussed above, by limiting the BASIC instructions that can be executed with the direct option to a few. This, however, certainly does not mean that these are the only ones that work. For example, HOME, VTAB and many others don't give any problems. In case you want to try other instructions, you have to extend the table at line 111 with the corresponding token values. However, be careful and leave the door of your drive open while experimenting, as you may otherwise get some unexpected results.

```
]RUN
ENTER FUNCTION: F(X) = SIN(X)*COS(X)*TAN(X)

1000  DEF  FN A(X) =  SIN (X) *  COS
     (X) *  TAN (X): RETURN

ENTER ARGUMENT ? 1

THE FUNCTION VALUE IS .708073418

ENTER ARGUMENT ? 2

THE FUNCTION VALUE IS .826821811

ENTER ARGUMENT ? 3

THE FUNCTION VALUE IS .0199148566
```

EXAMPLE 1A

```
]LIST

100   REM ***** EXAMPLE 1A
110   REM ***** INSERT USER DEFINE
      D FUNCTION IN PROGRAM
120   HOME : ONERR  GOTO 750
130   INPUT "ENTER FUNCTION: F(X)
      = ";A$
140   &  EXP "1000 DEF FNA(X)=" +
      A$ + ":RETURN"
150   GOSUB 1000: LIST 1000
160   PRINT : INPUT "ENTER ARGUMEN
      T ? ";A
170   LET A =  FN A(A): PRINT : PRINT
      "THE FUNCTION VALUE IS ";A
180   GOTO 160
750   REM ***** (PRIMITIVE) ERROR
      HANDLER
760   PRINT  CHR$ (7): IF  PEEK (2
      22) = 255 THEN  END
770   IF  PEEK (222) <  > 16 THEN
       PRINT "ILLEGAL ARGUMENT": GOTO
      160
780   PRINT "SYNTAX ERROR IN FUNCT
      ION DEFINITION"
790   PRINT "PROGRAM RESTARTED": GOTO
      130
1000   REM ****** FUNCTION WILL BE
       INSERTED HERE **************
      ****************************
      ****************************
      ****************************
      ************************
```

EXAMPLE 1B

```
]LIST

100   REM ***** EXAMPLE 1B
110   REM ***** CONVERT SMALL M.L.
       PROGRAM TO DATA STATEMENT
120   INPUT "ENTER START ADDRESS (
      HEX) ";A$: GOSUB 500:S = A
130   GOSUB 750
140   INPUT "ENTER LENGTH        (
      HEX) ";A$: GOSUB 500:E = S + A - 1
150   IF E < S THEN A =  - 1
160   GOSUB 750
170   LET A$ = ""
180   FOR I = S TO E
190   IF  LEN (A$) > 225 THEN A =
       - 1: GOSUB 750
200   LET A$ = A$ +  STR$ ( PEEK (
      I)) + ","
210   NEXT I
220   LET A$ =  LEFT$ (A$, LEN (A$
      ) - 1): REM REMOVE LAST COMMA
230   &  EXP "1000 DATA" + A$
240   LIST 1000
250   REM ***** NOW TEST IT BY SHO
      WING BASIC COMMANDS
255   PRINT : PRINT "SOME BASIC CO
      MMANDS": PRINT
```

```
260   FOR I = S TO E
270   READ A: PRINT  CHR$ (A);
280   NEXT
290   END
500   REM ***** CONVERT HEX TO DEC
      IMAL
510   REM ***** ENTRY A$, EXIT A,
      USES II,AA
520   LET A = 0:AA =  LEN (A$): IF
       NOT (AA) THEN A =  - 1: RETURN

530   FOR II = 1 TO AA
540   LET AA =  ASC ( MID$ (A$,II,
      1)): IF AA > 57 THEN AA = AA
       - 7
550   IF AA < 48 OR AA > 63 THEN A
      =  - 1: RETURN
560   LET A = AA - 48 + 16 * A
570   NEXT
580   RETURN
750   REM ***** (PRIMITIVE) ERROR
      HANDLER
760   IF A <  > - 1 THEN  RETURN

770   PRINT  CHR$ (7);"ERROR DETEC
      TED, PROGRAM RESTARTED"
780   CLEAR : GOTO 100
1000  REM ***** DATA STATEMENT WI
      LL BE INSERTED HERE ********
      ****************************
      ****************************
      ****************************
      ****************************
      ****************************
      ****************************
      ****************************
      **************
```

```
]RUN
ENTER START ADDRESS (HEX) D0D0
ENTER LENGTH        (HEX) 40

1000  DATA 69,78,196,70,79,210,78
      ,69,88,212,68,65,84,193,73,7
      8,80,85,212,68,69,204,68,73,
      205,82,69,65,196,71,210,84,6
      9,88,212,80,82,163,73,78,163
      ,67,65,76,204,80,76,79,212,7
      2,76,73,206,86,76,73,206,72,
      71,82,178,72,71,210

SOME BASIC COMMANDS

ENDFORNEXTDATAINPUTDELDIMREADGRTEXT
PR#IN#CALLPLOTHLINVLINHGR2HGR
```

EXAMPLE 2

```
]LIST

100   REM ***** EXAMPLE 2
110   REM ***** FUNCTION CALCULATOR
115   HOME : ONERR  GOTO 750
120   INPUT "ENTER FUNCTION ";A$:A
      $ = A$ + "(I)"
130   LET I = 11: &  EXP "A=" + A$
      : REM  CHECK WHETHER FUNCTIO
      N EXISTS
140   PRINT : PRINT : PRINT "TABLE
       OF ";A$: PRINT
150   PRINT "I"; TAB( 10);A$: PRINT
160   FOR I = 1 TO 5
170   PRINT I; TAB( 10);: &  EXP "
      PRINT" + A$
180   NEXT
190   PRINT : GOTO 120
750   REM ***** (PRIMITIVE) ERROR
      HANDLER
760   IF  PEEK (222) = 255 THEN  STOP
765   PRINT  CHR$ (7);"FUNCTION NO
      T DEFINED,PROGRAM RESTARTED"

770   CLEAR : GOTO 120
```

```
]
]RU N
ENTER FUNCTION SIN
TABLE OF SIN(I)          TABLE OF -(I)

I          SIN(I)        I          -(I)

1          .841470985    1          -1
2          .909297427    2          -2
3          .141120008    3          -3
4          -.756802495   4          -4
5          -.958924274   5          -5
ENTER FUNCTION -
```


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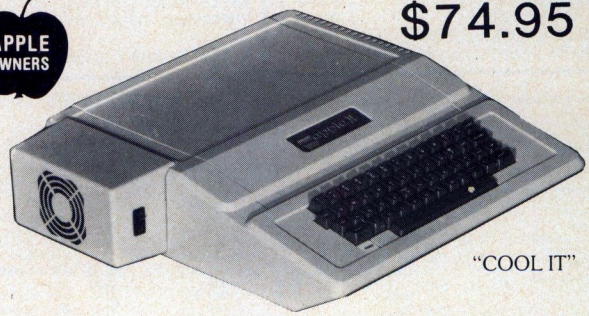

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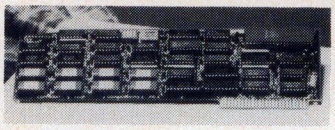

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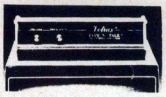

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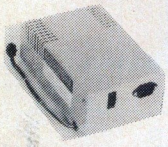

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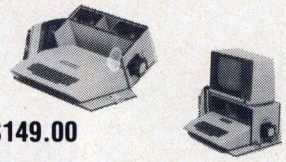

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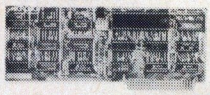

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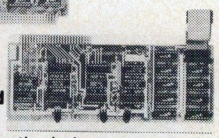

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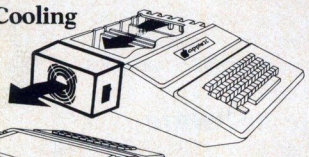

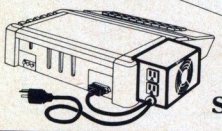

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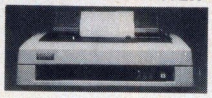

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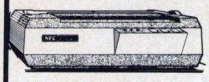

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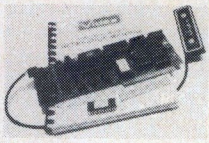

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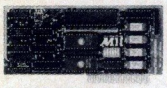

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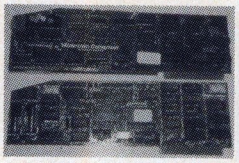

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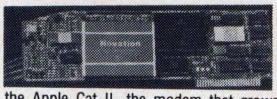

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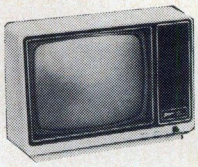

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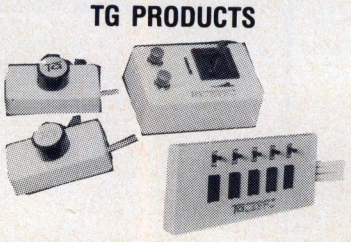

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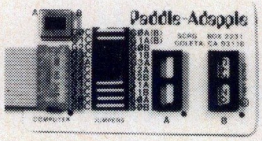

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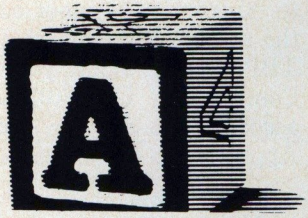

Ralph H. Swerdlow, M.D./Call —A.P.P.L.E. Staff Writer

Our printers are complicated machines. They are hybrid devices that convert electrical signals into mechanical movements.

In contrast, the monitor or T.V. screen is strictly an electrical apparatus, which responds to ON/OFF switches within the Apple that "light up" an area of the screen. Each character that we type to the screen is composed of dots, the correct combination forming the letter or number we see. There are no moving parts, no paper to print to, and above all, no need to issue specific commands to our Apples because the default condition (when the computer is first turned on) is to print to the screen what we type at the keyboard.

Therefore we must issue specific commands, enabling the electrical signals generated by the keyboard or a file on a disk, to be sent to our printers. We must also issue commands to turn off these signals to the printer when we wish to resume printing to the screen. Let us review how to best accomplish these tasks. I do not intend to write about specific commands that control size, intensity or underlining of the output from the printer, because these vary from one machine to an other, and you will have to refer to the documentation that accompanies your printer for details.

There are obviously only two circumstances in which printer commands are issued: 1. With DOS active and 2. Without DOS active, and only two types of printer commands: 1. Direct (immediate or not within a program) and 2. Deferred (or those within a program).

Let us study each:

Turn on your computer without a disk in the drive and after a second or so, hit the Reset Key. Be sure that your printer is turned on!! If you have Applesoft on board you will have the correct cursor. If you have the old monitor, the prompt will be the asterisk (*), and you will have to type Control-C to return to Integer basic. Now type "PR#S" with "S" being the number of the slot in which you have placed the controller card for your printer. Anything that is now typed at the keyboard will be sent to the printer *and* to the screen.

Go ahead and try this. If you precede any typing with "REM" you will not receive the "?SYNTAX ERROR" message, if you just want to type nonsense. Type any thing you wish, and then hit RETURN! Try a direct "PRINT" command by typing:

```
PRINT "HELLO,"
```
and of course, a **[RETURN.]**

You will see what you type, on the screen and the printer and the command executed with the word, "HELLO" appearing on both.

Try printing some other immediate commands such as:

```
"VTAB 5:PRINT "HELLO".
```

The screen will do exactly as you commanded; the printer will not, because most printers do not acknowledge VTAB orders. Therefore to print blank lines, use multiple print commands.

Type "HOME" (or CALL -936 in Integer), and the screen will clear, but the typing on the printer's paper will remain! There is no way for it to be erased electronically. Other formatting commands will work, such as:

```
PRINT TAB(15) "HELLO"
HTAB 15:PRINT "THIS IS HTAB
15"
```

Several immediate execution commands can be placed directly after each other, if separated by a colon (:), and they will be executed as if typed on individual lines.

If you have Applesoft, string and mathematical commands may also be executed. To demonstrate this, type:

```
A$ = "HELLO":PRINT A$
N = 144:PRINT SQR(N)
PRINT 12/4
PRINT CHR$(65)
```

Do you know what CHR$(65) represents? Here is a hint. Type:

```
FOR N = 0 TO 25:PRINT
CHR$(65 + N);:NEXT N
```

If you still don't know, look on page 138 of The Basic Programming Reference Manual (TBPRM). **Note:** this last command requires a semicolon (;) to print the CHR$(65 + N's) on one line across. The semicolon prevents the line feeds from the Apple.

Now try this:

```
FOR I = 1 TO 40:PRINT "X";:NEXT I
```

This command will print across the screen *and* the printer 40 "X"s in one horizontal line.

Now change the "40" in the above command to "80" and run again. The screen will print to its maximum width of 40 characters across, but so will the printer, because it is echoing the screen!! A line feed will be issued by the Apple, and the last 40 "X"s will be printed below the first group, on the printer as well.

What to do if you wish to print a 80 column line to the printer? The echoing function between the Apple and the printer must be disabled! Here is how to do it. Type:

```
[Ctrl-I] and a [RETURN]
80N and a [RETURN]
FOR I = 1 TO 80 : PRINT "X"; : NEXT I
and a [RETURN]
```

—◉→

PRINTER PROTOCOL

The commands "CONTROL-I" and "80N" enable the printer to print to 80 columns without echoing from the screen. Referring to page 138 of TBPRM once again, you will see that Control-I is CHR$(9) so we may accomplish the same commands (in Applesoft) in one of several ways:

```
I$ = CHR$(9)
PRINT I$;"80N"
FOR I = 1 TO 80:PRINT"X";:
NEXT N
```

OR:

```
I$ = CHR$(9) + "80N"
PRINT I$
FOR N = 1 TO 80:PRINT "X";:
NEXT N
```

When these lines are executed by typing RETURNS, the screen will go blank, but the printer will do as it was instructed, namely print one horizontal line of 80 "X"s!

Once the command "CONTROL-I" and "80N" are issued, anything that is typed at the keyboard will not be printed to the screen and you will not be able to read what you type until the RETURN key is hit, and the printer shows you. If you make an error in typing a command, you will not know until the printer types "?SYNTAX ERROR".

Now that you can print to 80 columns on your printer, you will need to be able to "TAB" to specific columns. There are many printers and word processors that will allow this to be done under software control, but an easy and almost fool proof way to do so is by the POKE 36,N command. The decimal location 36 is the Apple's memory site where is kept the value of the horizontal position for printing the next character. By POKEing 36 with the value of your choice, the printer will tab to that column. Here is a demonstration of this. Type:

```
PR#S
PRINT CHR$(9);"80N"
POKE 36,50
PRINT"HELLO"
```

You will have then printed "HELLO" to the 50th column.

Now, let's look at how to revert to normal computer operation, and disable the printer. The easiest way to do so is to merely hit RESET. This will return everything back to normal, but can not be used from within a program. Here is how to do this from within a program, and with DOS *inactive:*

type **NEW** and then:

```
10  HOME
20  PRINT "HELLO"
30  VTAB 10
40  HTAB 10
50  PRINT "HERE WE GO TO
    THE PRINTER"
60  PR#S (WHERE S IS IS YOUR
    PRINTER'S SLOT NUMBER)
70  PRINT CHR$(9);"80N"
80  POKE 36,50
90  PRINT "THIS IS COLUMN 50"
100 IN#0
110 PR#0
120 VTAB 16
130 PRINT "AND WE ARE NOW
    BACK TO THE SCREEN"
```

Each of the commands in this program are immediate and deferred execution types. Therefore you can merely type each line without writing the program and it will perform as indicated. If you do use the program, you can easily change lines 80 and experiment with different values. *Do not* save this program to a disk. This is a program to run with DOS *off.*

Line 100 returns the computer to the input from slot #0, and the PR#0 in line 110 will then enable output from the keyboard once again.

If this program is saved to a disk, and then run, it will most likely not function correctly. The reason that this is so is essentially associated with the way that DOS acts. Any command that changes the DOS input or output hooks can and often does, disconnect DOS, and one of these commands is, of all things, "PR#"! Perhaps you have experienced this in one of your programs when every thing was going just fine, the printer was humming, and then nothing. This is what happened. Your program issued a PR#0 command and disconnected the DOS.

(As an aside, DOS can be reconnected by a CALL 1002.)

This is not a real problem because the Apple can avoid these pit falls by using appropriate DOS commands when ever DOS is active. These consist entirely of preceding all commands to the printer with a CONTROL-D!

Boot a disk so DOS becomes active, retype the previous program and add line 5:

```
5   D$ = CHR$(4)
```

This is, of course, a CONTROL-D, as looking at page 138 of TBPRM once more demonstrates. Now delete line 100 because it is no longer required and change line 60 and 110 to:

```
60  PRINT D$;"PR#S"
110 PRINT D$;"PR#0"
```

where "S" is of course, the slot number of your printer's controller card.

If the changed program is saved to a disk, and then run, it will perform its job perfectly. We could have also written line 5 as:

```
5   D$ = " "
```

with the space between the quotes made by typing the first quote, then CONTROL-D, and the final quotation mark.

The D$ will not function unless it is the first character of a line and must be preceded by a carriage return. This is why many authors write: D$ = CHR$(13) + CHR$(4). Look at page 138 of TBPRM once again, and note that CHR$(13) is the carriage return!

To prove this, try this little experiment:

```
10  D$ = CHR$(4)
20  PRINT
30  PRINT D$;"CATALOG"
40  END
```

Now save this program to a disk, with the name "DEMO." When it is run, the disk will catalog.

Now change line 10 to:

```
10  D$ = CHR$(13) + CHR$(4)
```

The program will now function perfectly. Which you choose, a print statement followed by a carriage return and then the command with D$(4), or setting D$ = CHR$(13) + CHR$(4) is up to you and your programming habits. Some program commands can not be a print command and a carriage return, and you will be forced to use "D$ = CHR$(13) + CHR$(4)".

Here is a program that will demonstrate a way to make your printer output to any column width.

For less than 41 columns, you do not need line 120 because the default state will care for this. However, you should experiment with different values of "C" to print that many characters. "N" in line 120 tells the printer to print to paper width given by "C." If you are able to use a paper width of 120 columns, for example, set C=120; if your printer will only handle 80 column paper, set C=80.

```
10   D$ = CHR$ (13) + CHR$ (4)
20   HOME
30   PRINT "HELLO"
40   PRINT
50   INPUT "PRINTER SLOT
     = ";S
60   PRINT : INPUT "NUMBER
     OF COLUMNS :";C
70   VTAB 10
80   INVERSE
90   PRINT "HERE WE GO TO
     THE PRINTER"
100  NORMAL
110  PRINT D$;"PR#";S
120  PRINT CHR$ (9);C;"N"
130  FOR I = 1 TO C: PRINT "X";:
     NEXT
140  PRINT D$;"PR#0"
150  VTAB 16
160  PRINT "AND WE ARE BACK
     TO THE SCREEN"
```

Note the use of the semicolon in line 130 which enables all the X's to be printed on one line.

Here is a little program that might be a worth while addition to your utilities disk. It will print a catalog of a disk to your printer for a permanent record of the contents of the disk, and will allow you to add some additional information as well.

```
10   REM CATALOG PRINTER
     7-12-82
20   HOME : VTAB 12: INPUT
     "ENTER DATE :";N$
30   PRINT
40   INPUT "COMMENT ?:";K$
50   PRINT
60   INPUT "DISK IN WHICH
     DRIVE?:";DR
70   HOME
80   VTAB 12: HTAB 18: FLASH :
     PRINT "PRINTING":
     NORMAL
90   D$ = CHR$ (13) + CHR$ (4)
100  I$ = CHR$ (9)
110  PRINT D$;"PR#S"
120  PRINT I$;"80N"
130  PRINT N$
140  PRINT
150  PRINT K$
160  PRINT D$;"CATALOG,D";DR
170  PRINT D$;"PR#0"
180  HOME : VTAB 12: HTAB 16:
     PRINT "ALL DONE, BOSS":
     END
```

This program demonstrates many principles discussed earlier. Lets look at it.

Line 10 allows you to enter a date using a REMark statement. Line 20 clears the screen, sets the cursor to vertical position 12, asks the user to input a date, and creates a string consisting of the date you wish added when your disk's catalog is printed. **Note:** we can not use D$ for this purpose as we have assigned this character to be a CONTROL-D, so we use any other character for the String "DATE"; in this case I have elected to use N$, but the choice is purely arbitrary.

Lines 30 and 50 skip a line on the screen for more clarity and line 40 asks the user to input any comment desired. It is here that you can identify the contents of the disk. For example, my utility disk catalog printout has "UTILITIES 1/1/82" typed here. For my word processor data disks, I use "WORD PROCESSOR DATA FILES 1/1/82 TO..." as the comment I want to add. This way the catalog printout can always be identified with a labeled disk. If you don't wish to add a comment, just hit RETURN.

Line 60 allows you to put the disk you want cataloged into either drive, and then select which drive should be accessed. If you always use one drive this line may be omitted, but I have found it to be useful because I have two disk drives.

Line 70 clears the screen, and line 80 sets the screen to flashing mode and prints in the center of the screen the word "PRINTING." We will not be able to print if the output is in a flashing mode, so this line then converts the output to normal. Lines 90 through 180 should be easily understood by now. If they are not, please read this article from the beginning once again. The "S" in line 110 should be changed to the slot number of your printer.

Save this program to a disk with the name of "CATPRINTER." Whenever you wish a hard copy printout of a disk catalog, run it and there you have a printed catalog, dated and identified. Incidentally, if your catalog is quite long, the printer will stop printing after the first page is printed out. To continue printing, hit any key and you will be able to do so. This gives you a chance to change paper if you need to. When the entire catalog has been printed, the program will return to the screen, clear the screen, and print "ALL DONE, BOSS".

Making your printer do what you want is not difficult, if you know how to tell it what to do and how to do it. The few commands that perform these functions are easy to learn and to use. With just a little practice you too will be able to turn your printer on (and off) at will.

Bytes From A.P.P.L.E.

Continued from page 5

A couple of reminders before we leave you this month. We were a little late mailing our new product brochure to members. If it hasn't arrived yet, it will soon. Be sure and look for our super savings on seven new hardware items, and discount subscriptions to *Softalk* and *Peelings II.* We should also probably mention that we are now shipping **GLOBAL Program Line Editor,** the finest BASIC program editor available for the Apple. A bargain at $38.50.

For a closer, here's a "secret special." You won't find it on the order form, nor elsewhere in this issue, and it will not be included in our current mailer. *Apple Assembly Line* is a neat little 32 page Assembly Language newsletter edited by **Bob Sander–Cederlof,** author of the well known *S–C Assembler.* It is published monthly, and subscriptions are $15, exclusive of first class or foreign postage. It is filled with many helpful hints and subroutines for Assembly programmers, and one of the very few newsletters we "hold out" on when we pass our copies on to the General Office.

Bob has generously agreed to make this available to A.P.P.L.E. members for just $11.50 for the first year. Please make your checks payable to S–C Software Corporation and mail to P.O. Box 280300, Dallas, TX 75228. *Your A.P.P.L.E. membership number* **must** *be included.* First class postage, $3 additional, foreign and overseas airmail $13 additional.

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A CALL —A.P.P.L.E. APPLECATION:

Money Manager

Nelson R. Capes

THIS article describes a home finance program for the Apple][computer. Before you groan and stop reading, this is more than just another money manager program. It is easy to use but comprehensive. Furthermore, the price is unbeatable! Most home finance programs soak you in order to give you the privilege to manage your money!

About a year ago, I realized that I needed a better home finance program for keeping track of household expenditures. I researched the available options and concluded that I would write my own program, for the following reasons:

1) Several of the commercial data base management programs were more generalized than I needed, and therefore unnecessarily complicated.
2) Most of the home finance programs did not use standard Apple DOS or used other than text files for data storage. Consequently, it would, I thought, be difficult to back up my database or move it to some other database program.
3) Programs which were otherwise desirable were "prompting" type programs. Nothing is more annoying to me when I want to rapidly enter data than having to respond to a series of questions like "any more"? I wanted a screen-oriented program.
4) If there were bugs in a program that might clobber my data, I wanted to know where they were and how to fix up the data. There's no better way than to write your own program.

For these major reasons, I developed the "Money Manager" program discussed here.

The program has the following features:

- total screen management
- protected screen fields
- input field length checking
- last entry becomes default for minimum keying
- add,list,find,load,save, roll forward user functions
- debug function to check data base integrity
- "index sequential" file access via hash codes
- comprehensive memory management
- fast file save/load

A brief explanation of each of these features follows.

Unlike most home finance packages, this one is screen oriented. That is, the various data items needed for each record are taken from fields which are displayed on one screen, rather than prompting for each field as needed. This allows for much longer fields than would be the case if the entire string had to fit on a 40-character Apple line. Each function (add,list,find,load,save, roll forward) has its own formatted screen, so you know exactly what you are doing at any moment.

Protected Screen Fields

When each screen is displayed, the cursor is automatically positioned within the first unprotected field. Hitting carriage return moves the cursor to the start of the next unprotected field. Thus it is impossible to write over the protected fields on the screen. Hitting carriage return in the last unprotected screen field automatically wraps the cursor back to the first unprotected field, thus allowing you to back up and correct errors. Only when the entire screen is correct do you signal the program to update the database.

Input Field Length Checking

Each unprotected field is checked for valid length as data is entered. Attempting to enter more data than is allowed in the field results in a bell and rejection of the extra keystroke.

Last Entry Becomes Default For Minimum Keying

When entering large amounts of repetitive data (e.g., several months of mortgage payments), it is highly desirable to avoid re-keying the repetitive data. This program uses a method of "hidden defaults" whereby the last screen input is used as the default data for the next screen, until overridden by the operator.

Add,List,Find,Load,Save, Rollforward User Functions

The following functions are available to the operator:

- ADD- lets you add more records to the database.
- LIST- lets you list the database contents by month or code.
- FIND- lets you find an individual record by any field or combination of fields. The record may then be modified or deleted.
- LOAD- lets you load in a previously saved database. A fast machine language load subroutine minimizes loading time.
- SAVE- lets you save the current database to disk. All data is valid.
- ROLLFORWARD- the program will optionally keep an audit trail of all records input. In the event of a power failure or other catastrophic event, or if your database gets accidently clobbered later, you can use the ROLLFORWARD function to re-create the database from the audit trail.

—

"Index Sequential" File Access Via Hash Codes

One of the major problems with large databases is speed of access to a given record. Although it is desirable to be able to read the entire database sequentially (e.g., for doing totalling), there are many occasions on which one wants to access an individual record quickly. This program uses "hash codes" to provide random access to individual records via either of two keys: month or code. Once a starting point for reading is established, the database may also be read sequentially from that point.

In order to keep the program logic as simple as possible, no provision was made for hash code collision on the "code" field. Since more than one code may hash to the same hash code, I have provided an auxiliary program ("Code Checker") which will check your code set for collisions.

The database physical structure including hashing is described later in the article.

Operating Instructions

When the program is run, a message will appear indicating that initialization is in progress. Following initialization, the program will ask you whether you want the database to be audited. If you answer "N," then the database will not actually be updated on disk until you SAVE it. This is OK for small data files where it would not be too painful to re-enter the data. However, if you are going to be adding a lot of records to the database, answer "Y" and each record entered will be saved to an audit trail. If you have a power failure during the ADD, or if you find out later that your database cannot be loaded because of I/O errors, all you need to do is to load the previous version of the database and use the ROLLFORWARD function to get the added records from the audit trail.

After several seconds, the screen will clear and the main menu will be displayed (see Figure 1). At the top of the screen is the name of the database and the last modification date (these fields will be blank until a database is loaded in). At the bottom of the screen are fields which show the number of records in use and the number left. The following functions can then be selected by number:

1) ADD records to the database.
2) LIST the database.
3) FIND a particular record.
4) DEBUG the database.
5) LOAD a database from disk.
6) SAVE the active database to disk.
7) ROLLFORWARD from an audit trail on disk.

After entering your selection, *Do Not* hit carriage return. The selected function menu will now be displayed.

FIGURE 1

```
MAIN MENU
****
FILE:          LAST MODIFIED:
  YEAR     <      >
  MONTH    <   >
    1- ADD
    2- LIST
    3- FIND
    4- DEBUG      < ? >
    5- SAVE
    6- LOAD
    7- EXIT
    8- ROLL FORWARD
RECORDS USED=0
RECORDS LEFT=400
```

The ADD menu is shown in Figure 2:

FIGURE 2

```
ADD MENU
****
  YEAR       <     >
  MONTH      <   >
  DAY        <   >
  ITEM       <                    >
  CODE       <     >
  AMOUNT     <$         >
  ACCOUNT    <   >
RECORDS USED=0
RECORDS LEFT=400
```

Following each protected field is the data entry position, bracketed by inverse "<" and ">". The length of data accepted for each field will be obvious from the screen. For each field, enter the data followed by carriage return (the only optional field is YEAR — you must enter something for each of the other fields). If you try to enter more data in a field than allowed, the speaker will beep. All characters are valid as data except ESC and control characters (entering any of these characters can cause unpredictable results — the one control character that is allowed is [Ctrl-X], which can be used to clear the current input field to blanks).

The AMOUNT field is handled in a special manner. The program will try to recognize any combination of dollars and cents and right-justify the result in the field. For example, to enter an amount of one dollar just enter a "1" followed by carriage return. Experiment by entering expenses as positive amounts in the AMOUNT field and income as negative amounts. In this way, the program will calculate your net profit or loss for the period under consideration.

Before adding any records to a database, I recommend running the "Code Checker" program. This program keeps track of the CODE's in use and will tell you if a new code collides with an existing code. If it does, just pick some other easily-remembered code and try again. For example, if "AUTO" collides with some other code, try "CAR" instead.

When the last field has been entered, the program will ask you whether you want to add the record to the database or return to the main menu. If the record is not exactly the way you want it, just press carriage return and the cursor will return to the first data entry position. Keep on pressing carriage return until you get to the field that needs to be fixed. You can then use the right and left arrow keys to position the cursor to the character in error; then retype the field from that point.

When the record is correct, enter a "1" at the prompt and the record will be added to the database. **(Caution:** *if you selected auditing of the database at run time, you must leave the diskette in the selected drive during data entry, since every record is individually written to the diskette).*

After the record has been entered, the program will display the ADD menu again with the cursor positioned at the first data entry field. Repeat the procedure described above for adding the next record, with one important difference. *Note that as you move the cursor to each unprotected field with the carriage return key, the new field displays the value that was left in it from the last ADD.* The reason for this is to save unnecessary keying. If a data entry field in the next record is the same as it was in the last record, all you have to do is press carriage return and the new field will get the same value as the old one. Thus, if your mortgage payment is the same every month, you can key in an entire year's worth of mortgage payments by changing only the MONTH field on the menu. If you need to change a field, just type over it; otherwise, press carriage return.

When you are through entering records, enter a "2" at the prompt and you will be returned to the main menu.

LIST Function

To see what is in your database, enter a "2" at the main menu. The LIST menu will now be displayed. First, the program will ask whether to list to the screen or a printer (the default, "S," is displayed). To list to the screen, just press carriage return. To list to a printer, enter "P." If listing to a printer is selected, the program will now ask for the slot number of the printer card (the default, "1," is displayed). If your printer is in slot #1, just press carriage return; if not, enter the slot number followed by a carriage return.

Next, the program will ask whether you wish to list by date or by code. Listing by date will let you select only records for a particular month — to LIST the entire database, LIST by date and enter a carriage return for the month. Listing by date will let you select only records for a particular code.

If you are listing to the screen, the program will pause every 23 lines to let you see the full screen. Just hit any key to continue. *Note also that when you list to the screen, you will not see the entire "ITEM" field in a record if that field is longer than 23 characters. To see the whole field, list to a printer.*

FIND Function

The LIST function will only let you select by month or code. Suppose that you would like to find all records that were paid from account "NF" (this might be your checking account in Nome Federal Savings Bank). Just select function "3" from the main menu. The FIND menu will now be displayed (see Fig. 3).

FIGURE 3

```
FIND MENU
****

YEAR      <    >
MONTH     <  >
DAY       <  >
ITEM      <                 >
CODE      <    >
AMOUNT    <$        >
ACCOUNT   <NF>

RECORDS USED=348
RECORDS LEFT=52
```

```
]LIST

10  REM

MONEY MANAGER BY NELSON CAPES

CALL -A.P.P.L.E. : SEPT. 1982

20  GOTO 90: REM ..06/03/81.21:07

90  GOTO 9000: REM   INIT
900  FOR I = 1 TO 1000: NEXT I: RETURN

2000  REM
*********.MAIN LINE.****
      ****

2010  TEXT : HOME
2020  POKE 35,22: GOSUB 9310
2030  HOME
2040  PRINT  SPC( 9)"M A I N    M
      E N U": PRINT  SPC( 17)"***
      *"
2045  PRINT "FILE: "FF$; TAB( 15)
      ;"LAST MODIFIED: "TS$
2050  VTAB 5: PRINT  TAB( 5)"YEAR
      " TAB( 15);: INVERSE : PRINT
      "<";: NORMAL : PRINT "    ";
      : INVERSE : PRINT ">": NORMAL

2060  VTAB 7: PRINT  TAB( 5)"MONT
      H" TAB( 15);: INVERSE :: PRINT
      "<";: NORMAL : PRINT "  ";:::
       INVERSE : PRINT ">": NORMAL

2070  VTAB 10: PRINT  TAB( 10)"1-
       ADD": PRINT  TAB( 10)"2- LI
      ST": PRINT  TAB( 10)"3- FIND
      ": PRINT  TAB( 10)"4- DEBUG"
      : PRINT  TAB( 10)"5- SAVE": PRINT
       TAB( 10)"6- LOAD": PRINT  TAB(
      10)"7- EXIT": PRINT  TAB( 10
      )"8-ROLL FORWARD"
2080  VTAB 5: HTAB (16): PRINT YY
      $: VTAB 7: HTAB 16: PRINT MM
      $
2090  VTAB 13: HTAB (30): INVERSE
      : PRINT "<";: NORMAL : PRINT
      "?";: INVERSE : PRINT ">": NORMAL
      : VTAB 13: HTAB 31: GET FCT$
      :FCT =  VAL (FCT$)
2100  ON FCT GOTO 2120,2300,2850,
      3130,3260,3400,3560,4000
2110  GOTO 2030
2120  REM
******.ADD.******
2130  IF REC < 10 THEN  VTAB 24: PRINT
      "ONLY 10 RECORDS LEFT!!!"
2140  HOME
2150  PRINT  SPC( 11)"A D D    M
      E N U": PRINT  SPC( 17)"****
      "
2160  GOSUB 9400: GOSUB 9470: REM
       DISPLAY SCREEN
2170 R$ = K$ + II$ + CC$ + AA$ +
      AC$
2180  CALL 54915: REM  CLEAN UP S
      TACK
2190  VTAB 18: PRINT  TAB( 12)"1-
      ENTER": PRINT  TAB( 12)"2-MA
      IN MENU"
2200  VTAB 21: PRINT  TAB( 18);:
       INVERSE : PRINT "<";: NORMAL
      : PRINT "?";: INVERSE : PRINT
      ">": NORMAL : VTAB 21: HTAB
      19
2210  GET A$:A =  VAL (A$)
2220  IF  ASC (A$) = 13 THEN  GOSUB
      9470: GOTO 2170
2230  ON A GOTO 2240,2030
2240  REM
***.ENTER THE DATA.****
```

Any field that is left blank is not used for the search. Conversely, any field that you enter data for will be used for the search. Only those records which match all of the selected fields will be displayed. In this case, just enter "NF" for account and leave the rest of the fields blank. When the program finds the first record, it will display it. You now have the following options:

1) Continue the search: if you select this option, the menu will be blanked. You must re-enter your search criteria (in this case, "NF" for ACCOUNT). The program will look for the next matching record. If you do not enter anything in any of the fields, the program will display the next sequential record in the database. You could also restrict search by entering an additional search field (for example, you might only be interested in records paid from the "NF" account that were for $100.00). The only thing to keep in mind is that you should not change either of the key fields (month/day or code) during the search, as this will produce unpredicatable results.
2) Change a field: selecting this option lets you alter an individual field in the record. The cursor is positioned at the first data-entry position. As usual, just retype to change a field and use a carriage return to skip to the next field. However, you are not allowed to change either of the key fields (MONTH/DAY or CODE) since this would put the record in an incorrect position in the database. If you have to change a key field, delete the entire record (using option "3") and re-enter it (with ADD).
3) Delete a record: selecting this option will delete the record. The program will first ask you if you really want to do the delete — if you answer "Y" the record will be deleted. However, unless you SAVE the database back to disk, your original file will not be altered.
4) Return to main menu.

DEBUG Function

Although I have used this program continuously for over a year with excellent results, any program is subject to bugs that could corrupt your database. Also, if you do not use the "Code Checker" program, you may get two different codes which "hash" to the same address; if this happens, one of your records may not be visible to the program. If you suspect a bug or bad hashing, you can use the DEBUG function to dump out the database and its pointers. With a knowledge of what the database is supposed to look like (as described later in this article) and what your data is supposed to look like, you can fix the database by writing a simple BASIC program which reads in the database, fixes the bad record, and outputs the database again. Although it may surprise people who are not in data processing, this kind of thing sometimes even has to be done with databases on large commercial computers...it is just the nature of the beast.

The DEBUG function has no menu. As soon as you enter a "4" from the main menu, the printing will start. The program is set up for your printer card in slot #1. To change the slot assignment or use a special driver, change line 3140 of the Money Manager program.

```
2250  GOSUB 10000: REM  GET FREE
     RECORD
2260  GOSUB 10010: NOTRACE : REM
           INSERT
2270 NUM = NUM + 1
2280  GOSUB 9300
2290  GOTO 2130
2300  REM
****.LIST.****
2310  HOME
2320  PRINT  SPC( 9)"L I S T    M
     E N U": PRINT  SPC( 17)"***
     *"
2330  VTAB 5: PRINT  TAB( 5)"LIST
      ON SCREEN OR PRINTER?";: INVERSE
     : PRINT "(";: NORMAL : PRINT
     " ";: INVERSE : PRINT ")": NORMAL

2340 O$ = "S": VTAB 5: HTAB 32: PRINT
     O$;: HTAB 32:MM = 1: GOSUB 6
     0020: PRINT
2350  IF T$ <  > "" THEN O$ = T$
2360  IF O$ = "S" THEN 2420
2370  VTAB 5: HTAB 32: PRINT O$
2380  VTAB 10: PRINT  TAB( 5)"PRI
     NTER SLOT #?";: INVERSE : PRINT
     "(";: NORMAL : PRINT " ";:::
      INVERSE : PRINT ")": NORMAL

2390 SL$ = "1": VTAB 10: HTAB 21:
      PRINT SL$;: HTAB 21:MM = 1:
      GOSUB 60020
2400  IF T$ <  > "" THEN SL$ = T$
2410  VTAB 10: HTAB 21: PRINT SL$

2420  VTAB 15: PRINT  TAB( 5)"LIS
     T BY:"
2430  PRINT  TAB( 13)"1-DATE": PRINT
      TAB( 13)"2-CODE"
2440  VTAB 20: HTAB (30): INVERSE
     : PRINT "(";: NORMAL : PRINT
     "?";: INVERSE : PRINT ")": NORMAL
     : VTAB 20: HTAB 31:MM = 1: GOSUB
     60020:A =  VAL (T$)
2450  IF A = 2 THEN 2510
2460  IF A = 1 THEN  HOME : VTAB
     10: PRINT  TAB( 10)"WHAT MON
     TH?";: INVERSE : PRINT "(";:
      NORMAL : PRINT "  ";: INVERSE
     : PRINT ")": NORMAL
2470  VTAB 10: HTAB 22:MM = 2:MM$
      = "  ": GOSUB 60020
2480  IF T$ <  > "" THEN MM$ = T$

2490  IF MM$ = "  " THEN M = 13: GOTO
     2540: REM  FORCE LIST OF ALL
      RECORDS
2500 M =  VAL ( LEFT$ (MM$,2)): GOTO
     2540
2510  HOME : VTAB 10: PRINT  TAB(
     10)"WHAT CODE?";: INVERSE : PRINT
     "(";: NORMAL : PRINT "    ";
     : INVERSE : PRINT ")": NORMAL

2520  VTAB 10: HTAB 21:CD$ = "":M
     M = 4: GOSUB 60020
2530  IF T$ <  > "" THEN CD$ = T$
```

Save Function

Selecting function "5" from the main menu will allow you to save the database you are working on to the diskette. The program will ask you for the name of the database and the slot and drive numbers (defaults are 6,1). Then it will ask you for a DATE and TIME. The date and time you enter will be saved on the database as the last modification date. Not only is this useful for keeping track of different versions of the database, but this information is also used in the ROLLFORWARD function to make sure that the audit trail matches the database in memory.

Load Function

Selecting function "6" from the main menu will let you load an existing database into memory. The program asks for the name of the database and the slot and drive numbers (default: 6,1) of the diskette. If the database does not exist, you will get an error message and the main menu will reappear. If an I/O errror occurs during LOADing, you will be notified. When the database is successfully loaded, you will be returned to the main menu and the file name and last modification date will be shown at the top of the screen. The number of records used and the number left will be shown at the bottom of the screen.

Exit Function

Selecting function "7" will return control of the computer to Applesoft. However, you can re-enter the program without data loss by entering **GOTO 2000.**

ROLLFORWARD Function

The last function that we will discuss is ROLLFORWARD. This function provides you with the capability of rolling forward your database from a backup copy and an audit trail. The audit trail is automatically created as you add records to a database if you select this option when you run the program. Since the audit trail can be on a different drive than your database, this provides an effective backup capability if in addition you keep what are known in the IBM world as "generation data sets." All this means is that instead of loading in a database, modifying it, and then saving the modified database under the same name, you choose a different name for the updated database. Then, with the audit trail selected, you add records. Every record you add is written to the disk. When you finish adding data, you save the modified database under the new name, leaving the old, backup copy intact. If a disk I/O error prevents you from loading in the new database, just load in the old one and select ROLLFORWARD. This function then reads in the records from the audit trail and adds them back to re-create the modified database, automatically!*

Another possible use of ROLLFORWARD is to load text files created by another home finance package or a word processor into the Money Manager. Of course, the records loaded must be in the same format as the Money Manager records, as described later.

When you select ROLLFORWARD the program will ask you for a DATE and TIME. This information is used when the audit trail is accessed to make sure that you are using the right audit trail. If the modification date of the audit trail is less than the modification date of the database, the ROLLFORWARD will not be allowed. This prevents you from accidentally rolling forward over the wrong data.

**Any fields that are changed or records that are deleted will not be updated in the audit trail file. You will need to re-apply these changes if you use ROLLFORWARD to recover a data base.*

Database Structure

The following discussion is provided for those readers who wish to understand the physical structure of the database. This information is valuable for finding inconsistencies in the database and in the event you

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```
2540  IF O$ = "S" THEN 2560
2550  PRINT SD$: PRINT SD$;"FR#";
      : PRINT SL$: PRINT
2560  IF O$ = "S" THEN  HOME : PRINT
      TAB( 18)YY$: GOTO 2580
2570  PRINT  SPC( 40)YY$
2580  IF O$ = "S" THEN  PRINT "MO
      NTH" TAB( 7)"DAY" TAB( 11)"I
      TEM" TAB( 21)"CODE" TAB( 26)
      "AC" TAB( 30)"AMOUNT": GOTO
      2600
2590  PRINT "MONTH" SPC( 5)"DAY" SPC(
      5)"ITEM" SPC( 30)"CODE" SPC(
      5)"ACCOUNT" SPC( 5)"AMOUNT"
2600  IF O$ = "S" THEN N = 40: GOTO
      2620
2610 N = 80
2620 L$ = "": FOR I = 1 TO N:L$ =
      L$ + "-": NEXT : PRINT L$: PRINT

2630  IF A = 2 THEN 2660
2640  IF M = 13 THEN C = SD%(0): GOTO
      2690
2650 C = SD%(M): GOTO 2690
2660  IF CD$ = "" THEN C = SC%(0)
      : GOTO 2690
2670 KD$ = CD$: GOSUB 10500: REM
      HASH THE KEY
2680 C = SC%(HASH)
2690 SUM = 0
2700  IF C = 0 THEN 2740
2710 OHASH = HASH:KD$ =  MID$ (B$
      (C),28,4): GOSUB 10500: IF (
      C = 0) OR (A = 1 AND  VAL ( LEFT$
      (B$(C),2)) > M) OR (A = 2 AND
      CD$ <  > "" AND OHASH <  > H
      ASH) THEN 2740
2720  IF (A = 2 AND CD$ <  > "" AND
      CD$ <  >  MID$ (B$(C),28,4))
       THEN 2840
2730  GOTO 2760
2740  IF O$ = "P" THEN  PRINT  SPC(
      50)"TOTAL= "SUM: PRINT SD$"P
      R#0": GOTO 2030
2750  PRINT  TAB( 25)"TOTAL="SUM:
      PRINT "HIT ANY KEY TO CONTI
      NUE";: GET A$: GOTO 2030
2760 MM$ =  LEFT$ (B$(C),2):DD$ =
       MID$ (B$(C),3,2):CC$ =  MID$
      (B$(C),28,4):AA$ =  MID$ (B$
      (C),32,7):AC$ =  MID$ (B$(C)
      ,39,2)
2770  IF O$ = "S" THEN II$ =  MID$
      (B$(C),5,9): GOTO 2800
2780 II$ =  MID$ (B$(C),5,23)
2790  PRINT MM$ SPC( 10 -  LEN (M
      M$))DD$ SPC( 8 -  LEN (DD$))
      II$ SPC( 34 -  LEN (II$))CC$
       SPC( 9 -  LEN (CC$))AC$ SPC(
      12 -  LEN (AC$))AA$: GOTO 28
      10
2800  PRINT MM$ TAB( 7)DD$ TAB( 1
      1)II$ TAB( 21)CC$ TAB( 26)AC
      $ TAB( 30)AA$
2810  IF O$ = "S" AND  PEEK (37) =
      21 THEN  PRINT "HIT ANY KEY
      TO CONTINUE": GET A$: HOME
2820 SUM = SUM +  VAL (AA$)
```

want to load data from another finance package or word processor into the Money Manager.

The Money Manager database is physically structured as a multi-list chain (Martin, p.425-26). There are two chains of records within this structure: a chain sequentially organized by MONTH/DAY; and a chain sequentially organized by CODE. Two integer array variables (ND% and NC%) contain the chains. Each cell points to the next cell, with the last cell containing a zero. These pointers are actually the ordinal number of the cell within another array (B$) which contains the actual records. Two other arrays (SD% and SC%), contain pointers to the starting cell in arrays ND% and NC% for individual months and codes, with the (0) elements pointing at the start of the lists.

The best way to understand this is to take a look at an actual database (Fig. 4). This is just the output of the DEBUG function for a 10-record sample database.

We can see from the figure that NUM=10 and REC=390. This means that the database contains 10 records and has space for 390 more (this is for a 48K Apple — systems with less memory will be able to hold fewer records in memory). The variable SD%(0) is the head-pointer for the MONTH/DAY list — it points at record #1. We can now follow this chain. Record #1 contains the data "0101MORTGAGE PAYMENT HOUS450.00AA"; we will look at the record format in a bit. For now, note that this record is for January 1. The variable ND%(1) is the next-record pointer for the MONTH/DAY chain; it points at record #3. Record #3 is for January 2. The next record pointer for record #3 points at record #5...and so on, with the records for later and later dates until we get to record 6 ND%(6), which contains a zero, meaning end-of-chain.

The variable SC%(0) is the head-pointer for the CODE chain; follow this chain through the array NC% starting at record #4 as indicated by the head-pointer and you will see the chain of records in ascending order by CODE (AUTO,ENTN,HOUS, etc.). Record #6 is the last record in the chain.

The array SD% contains the starting record number for each month (1-12); for example, SD%(1) contains the starting record number within array ND% for January; SD%(2) contains the starting record number for February, etc. Verify that January does indeed start with ND%(1) and February starts with ND%(2).

The array SC% contains the starting record number for each possible hash value (1-99). A hash value is simply the result of an algorithm applied to a CODE to get a numerical number which is then used to find the starting point within the CODE chain for that code. For example, look at variable SC%(9). This says that a particular CODE hashed to a value of 9 and the first record with that code begins at NC%(2); that is, SC%(9) = 2. Looking at NC%(2), we see that the record at that location has a CODE of HOUS. We can now follow the NC% chain and find more records with HOUS until a different code is found.

FIGURE 4

```
PROGRAM SIZE= 13952
FREE SPACE= 18647
NUM= 10     REC= 390
SD%(0)= 1     SC%(0)= 4
ND%(1)= 3        0101MORTGAGE PAYMENT          HOUS      450.00AA
ND%(3)= 5        0102CAR PAYMENT               AUTO      150.00BB
ND%(5)= 7        0103ELECTRIC & GAS            UTIL       65.00CC
ND%(7)= 8        0104TELEPHONE                 UTIL       45.00DD
ND%(8)= 9        0105DINNER AT ACME'S          ENTN       25.00EE
ND%(9)= 10        0110BUSINESS WEEK SUBSCR.    NSPR       25.00FF
ND%(10)= 2        0115PAYROLL -1/1 -15         PAY      -325.00GG
ND%(2)= 4        0202MORTGAGE PAYMENT          HOUS      450.00AA
ND%(4)= 6        0202CAR PAYMENT               AUTO      150.00BB
ND%(6)= 0        0203ELECTRIC & GAS            UTIL       65.00CC
ND%(0)= 1
NC%(4)= 3        0202CAR PAYMENT               AUTO      150.00BB
NC%(3)= 8        0102CAR PAYMENT               AUTO      150.00BB
NC%(8)= 2        0105DINNER AT ACME'S          ENTN       25.00EE
NC%(2)= 1        0202MORTGAGE PAYMENT          HOUS      450.00AA
NC%(1)= 9        0101MORTGAGE PAYMENT          HOUS      450.00AA
NC%(9)= 10        0110BUSINESS WEEK SUBSCR.    NSPR       25.00FF
NC%(10)= 5        0115PAYROLL -1/1 -15         PAY      -325.00GG
NC%(5)= 7        0103ELECTRIC & GAS            UTIL       65.00CC
NC%(7)= 6        0104TTELEPHONE                UTIL       45.00DD
NC%(6)= 0        0203ELECTRIC & GAS            UTIL       65.00CC
NC%(0)= 1
SD%(1)= 1
SD%(2)= 2
SD%(3)= 0
SD%(4)= 0
SD%(5)= 0
SD%(6)= 0
SD%(7)= 0
SD%(8)= 0
SD%(9)= 0
SD%(10)= 0
SD%(11)= 0
SD%(12)= 0
SC%(5)= 5
SC%(9)= 2
SC%(21)= 9
SC%(62)= 10
SC%(78)= 8
SC%(92)= 4
AD%= 11        AC%= 11
```

These two chains, SD% and SC%, allow the program to rapidly locate the position in the MONTH/DAY or CODE chains, respectively, where a record is to be inserted or where the first record with a particular key can be found. For large databases, this speeds up insertion and searching immensely.

This organization allows records to be inserted and retrieved in sequential order, thus precluding the need for a sort routine. The general name for this type of database organization is "index sequential".

Finally, two variables (AD% and AC%) point to the next available record in the two chains for inserting records.

Record Structure

The records in the database are 40 characters long, fixed-length, with fixed fields. These fields occupy the following locations within the record:

MONTH	1–2
DAY	3–4
ITEM	5–27
CODE	28–31
AMOUNT	32–38 (right-justified)
ACCOUNT	39-40

This is also the format of the records which are created by the ROLLFORWARD function. It would be possible to load data from another finance package or from a word processor into the money manager if the data can be set up with this structure.

When we LIST out this sample database, we get the output shown in Fig. 5.

There may be very rare occasions (especially if the Code Checker program is not used to pre-verify all codes for conflicts) when a record may be inserted at an incorrect position in one or both of the chains. The symptoms of this will usually be that the record will appear in the output of a LIST command but will not be found when a FIND command is issued. If this happens, take a dump of the database with the DEBUG function and examine the chains for the proper sequence. You will usually

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FIGURE 5 = OUTPUT OF LIST FUNCTION FOR SAMPLE DATABASE

MONTH	DAY	ITEM	1982 CODE	ACCOUNT	AMOUNT
01	01	MORTGAGE PAYMENT	HOUS	AA	450.00
01	02	CAR PAYMENT	AUTO	BB	150.00
01	03	ELECTRIC & GAS	UTIL	CC	65.00
01	04	TELEPHONE	UTIL	DD	45.00
01	05	DINNER AT ACME'S	ENTN	EE	25.00
01	10	BUSINESS WEEK SUBSCR.	NSPR	FF	25.00
01	15	PAYROLL -1/1 -15	PAY	GG	-325.00
02	02	MORTGAGE PAYMENT	HOUS	AA	450.00
02	02	CAR PAYMENT	AUTO	BB	150.00
02	03	ELECTRIC & GAS	UTIL	CC	65.00
				TOTAL= 1100	

```
2830  IF A = 1 THEN C = ND%(C): GOTO
     2700
2840 C = NC%(C): GOTO 2700
2850  REM
***.FIND.***

2860  HOME : PRINT  SPC( 9)"F I N
      D   M E N U": PRINT  SPC( 1
     7)"****"
2870  GOSUB 9400
2880 MM$ = "":DD$ = "":CC$ = "":I
     I$ = "":AA$ = "":AC$ = ""
2890  GOSUB 9470
2900 M = 0:HASH = 0
2910  IF MM$ <  > "" THEN M =  VAL
     (MM$): GOTO 2930
2920  IF CC$ <  > "" THEN KD$ = C
     C$: GOSUB 10500
2930 RC = 0: GOSUB 9800: REM  SEA
     RCH FOR KEYS
2940  IF RC <  > 0 THEN 3060
2950  VTAB 5: HTAB 16: PRINT YY$:
      VTAB 7: HTAB 16: PRINT FM$:
      VTAB 9: HTAB 16: PRINT FD$:
      VTAB 11: HTAB 16: PRINT FI$
     : VTAB 13: HTAB 16: PRINT FC
     $: VTAB 15: HTAB 17: PRINT F
     A$: VTAB 17: HTAB 16: PRINT
     FF$
2960  VTAB 18: PRINT  TAB( 5)"1-C
     ONTINUE SEARCH" TAB( 24)"2-C
     HANGE A FIELD": PRINT  TAB(
     5)"3-DELETE RECORD" TAB( 24)
     "4-MAIN MENU"
2970  VTAB 21: PRINT  TAB( 18);:
      INVERSE : PRINT "<";: NORMAL
     : PRINT "?";: INVERSE : PRINT
     ">": NORMAL : VTAB 21: HTAB
     19: GET A$:A =  VAL (A$): IF
      ASC (A$) = 13 THEN 2970
2980  ON A GOTO 2990,3030,3070,30
     60
2990  HOME :MM$ = "":DD$ = "":CC$
      = "":II$ = "":AA$ = "":AC$ =
     "":M = 0:HASH = 0: GOSUB 940
     0: GOSUB 9470
3000  IF MM$ <  > "" THEN M =  VAL
     (M$):C = ND%(C): GOSUB 9840:
      GOTO 2940
3010  IF CC$ <  > "" THEN KD$ = C
     C$: GOSUB 10500:C = NC%(C): GOSUB
     9840: GOTO 2940
3020 C = ND%(C): GOSUB 9840: GOTO
     2940
3030 MM$ = "":DD$ = "":II$ = "":C
     C$ = "":AA$ = "":AC$ = "":RC
      = 0: GOSUB 9470: GOSUB 9910

3040  IF RC <  > 0 THEN  GOTO 285
     0
3050  GOTO 3060
3060  GOSUB 9310: GOTO 2030
3070  VTAB 22: PRINT  CHR$ (7);"A
     RE YOU SURE?";: GET A$
3080  IF  LEFT$ (A$,1) <  > "Y" AND
      LEFT$ (A$,1) <  > "N" OR  ASC
     (A$) = 13 THEN 3070
3090  IF  LEFT$ (A$,1) = "N" THEN
     3060
3100 RC = 0: GOSUB 11000: REM  D
     ELETE IT
```

find that two different codes hash to the same value and that the records for these codes will be intermixed on the NC% chain. It is very simple to correct this error by loading the database into any word processor that will accept Apple text files and altering the pointers to point at the correct records. Alternatively, you could write an Applesoft program that reads in the database, fixes up the record chains, and writes it back out. To do this, use the LOAD and SAVE functions as models for the code involved.

Bibliography

Goez, Eric E., "Input Anything Subroutine," Call -A.P.P.L.E. June 1980, pp. 28-30.

Martin, James, "Computer Data-Base Organization," Prentice-Hall, Inc., Englewood Cliffs, N.J., 1977.

Mottola, R.M., "Inputting Strings with Commas," Nibble Vol.2,No.2, p. 57.

Modified versions of these programs are used in the MoneyManager program. Credit is hereby extended to the authors.

Enter Monitor with CALL -151 and enter:

```
300:  20 BE DE 20 E3 DF 24 11
      EA EA EA EA EA EA EA 85
      85 84 86 A5 B8 A4 B9 85
      87 84 88 2- 2C D5 AD 00
```

. . . now hit [RETURN] then enter:

```
:  02 C9 03 D0 03 4C 63 D8
   A9 00 85 0D 85 0E A9 00
   A0 02 20 ED E3 20 3D E7
   20 7B DA A5 87 A4 88 85
   B8 84 B9 20 B7 00 60
```

. . . hit [RETURN] and enter:

BSAVE INPUT, A$300, L$47

. . . hit [RETURN] and type

3 DOG [RETURN]

```
3110  IF RC = 0 THEN NUM = NUM -
      1:REC = REC + 1:B$(C) = "?":
      GOSUB 9310
3120  GOTO 3060
3130  REM
***.DEBUG.***

3140  HOME : PRINT SD$: PRINT SD$
      "PR#1": PRINT  TAB( 35)"DEBU
      G"
3150  PRINT "PROGRAM SIZE= "( PEEK
      (175) +  PEEK (176) * 256) -
      ( PEEK (103) +  PEEK (104) *
      256): PRINT "FREE SPACE= "( PEEK
      (111) +  PEEK (112) * 256) -
      ( PEEK (109) +  PEEK (110) *
      256)
3160  PRINT "NUM= "NUM; TAB( 5)"R
      EC= "REC
3170  PRINT "SD%(0)= "SD%(0) TAB(
      5)"SC%(0)= "SC%(0):I = SD%(0
      ):J = SC%(0)
3180  PRINT "ND%("I")="ND%(I); TAB(
      15)B$(I): IF I <  > 0 THEN I
      = ND%(I): GOTO 3180
3190  PRINT "NC%("J")= "NC%(J); TAB(
      15)B$(J): IF J <  > 0 THEN J
      = NC%(J): GOTO 3190
3200  FOR I = 1 TO 12: PRINT "SD%
      ("I")= "SD%(I): NEXT I
3210  FOR I = 1 TO 99: IF SC%(I) <
      > 0 THEN  PRINT "SC%("I")=
      "SC%(I)
3220  NEXT I: PRINT "AD%= "AD%; TAB(
      10)"AC%= "AC%:I = AD%:J = AC
      %
3230  IF B$(I) <  > "" THEN  PRINT
      "ND%("I")="ND%(I); TAB( 15)B
      $(I)
3240  IF I <  > 0 THEN I = ND%(I)
      : GOTO 3230
3250  PRINT SD$"PR#0": PRINT SD$:
      GOTO 2030
3260  REM
***.SAVE.***

3270  HOME : PRINT  SPC( 11)"S A
      V E    M E N U": PRINT  SPC(
      17)"****"
3280  VTAB 5: PRINT  TAB( 5)"FILE
      " TAB( 15);: INVERSE : PRINT
      "(";: NORMAL : PRINT "
        ";: INVERSE : PRINT ")": NORMAL

3290  VTAB 5: HTAB 16:FF$ = YY$: PRINT
      FF$;:MM = 8: GOSUB 60020
3300  VTAB 10: HTAB 16: INPUT "SL
      OT";SL$: VTAB 11: HTAB 16: INPUT
      "DRIVE";DR$
3305  VTAB 12: HTAB 10: INPUT "DA
      TE/TIME(MM/DD HH;MM)";TS$
3310  IF T$ <  > "" THEN FF$ = FF
      $ + T$
3320  PRINT SD$"OPEN DB."FF$",S"S
      L$",D"DR$
3330  REM
3340  PRINT SD$"WRITE DB."FF$
3350  PRINT YY$: PRINT NUM: PRINT
      AD%: FOR I = 0 TO 12: PRINT
      SD%(I): NEXT I: PRINT AC%: FOR
      I = 0 TO 99: PRINT SC%(I): NEXT
      I
3360  FOR I = 1 TO MAX: PRINT ND%
      (I): PRINT NC%(I): NEXT
3370  FOR I = 1 TO NUM: PRINT B$(
      I): NEXT
3375  PRINT TS$
3380  PRINT SD$"CLOSE DB."FF$
3390  GOTO 2030
3400  REM
***.LOAD.***

3410  HOME : PRINT  SPC( 11)"L O
      A D    M E N U": PRINT  SPC(
      17)"****"
3420  VTAB 5: PRINT  TAB( 5)"FILE
      " TAB( 15);: INVERSE : PRINT
      "(";: NORMAL : PRINT "
        ";: INVERSE : PRINT ")": NORMAL

3430  VTAB 5: HTAB 16:FF$ = YY$: PRINT
      FF$;:MM = 8: GOSUB 60020
3440  IF T$ <  > "" THEN FF$ = FF
      $ + T$
3450  ONERR  GOTO 32000
3460  VTAB 10: HTAB 16: INPUT "SL
      OT";SL$: VTAB 11: HTAB 16: INPUT
      "DRIVE";DR$
```

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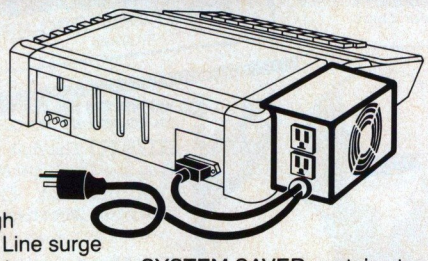

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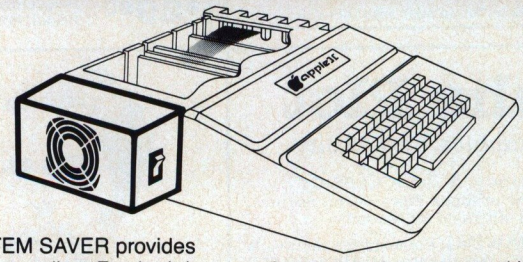

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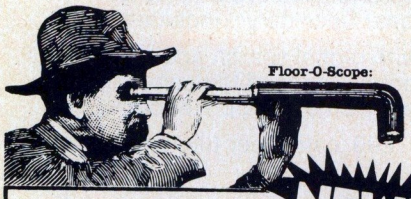

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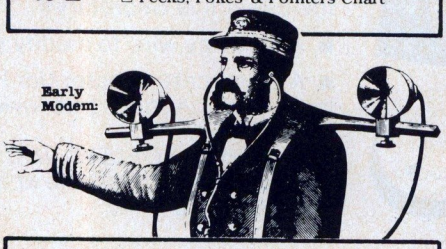

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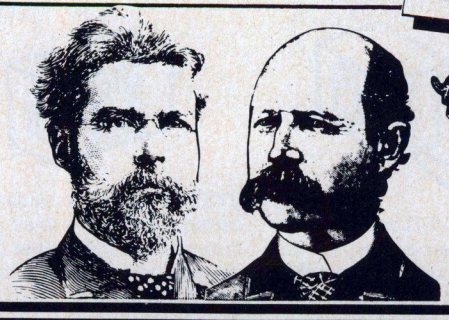

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MONEY MANAGER

```
3470  PRINT SD$"RENAME DB."FF$",D
      B."FF$",S"SL$",D"DR$
3480  PRINT SD$"OPEN DB."FF$",S"S
      L$",D"DR$
3490  PRINT SD$"READ DB."FF$
3500  INPUT YY$: INPUT NUM: INPUT
      AD%: FOR I = 0 TO 12: INPUT
      SD%(I): NEXT I: INPUT AC%: FOR
      I = 0 TO 99: INPUT SC%(I): NEXT
      I
3510  FOR I = 1 TO MAX: INPUT ND%
      (I): INPUT NC%(I): NEXT
3520  FOR I = 1 TO NUM: CALL 768,
      B$(I): NEXT
3525  CALL 768,TS$
3530  PRINT SD$"CLOSE DB."FF$
3540 REC = REC - NUM + 1: GOSUB 9
      300
3550  GOTO 2030
3560  REM
***.EXIT.***

3570  TEXT : HOME : VTAB 23: PRINT
      "BYE": END
4000  REM
******.ROLL FORWARD.***
      *****

4100  HOME
4200  PRINT  SPC( 11)"R O L L   F
      O R W A R D": PRINT  SPC( 1
      7)"*****"
4300  VTAB 10: HTAB 5: INPUT "DAT
      E/TIME (MM/DD HH;MM)";TI$
4400  VTAB 11: HTAB 16: INPUT "SL
      OT?";SA$
4500  VTAB 12: HTAB 16: INPUT "DR
      IVE?";DA$
4550  ONERR  GOTO 5000
4600  PRINT SD$"VERIFY LOG."TI$",
      S"SA$",D"DA$
4650  PRINT SD$"OPEN LOG."TI$",S"
      SA$",D"DA$
4655  PRINT SD$"READ LOG."TI$
4660 RFWD = 1
4662  ONERR  GOTO 4900
4663  CALL 768,TI$
4664 T1$ =  LEFT$ (TI$,2) +  MID$
      (TI$,4,2) +  MID$ (TI$,7,2) +
       RIGHT$ (TI$,2):T2$ =  LEFT$
      (TS$,2) +  MID$ (TS$,4,2) +
       MID$ (TS$,7,2) +  RIGHT$ (T
      S$,2): IF T1$ < T2$ THEN  VTAB
      12: FLASH : PRINT  CHR$ (7)"
      AUDIT FILE EARLIER THAN DATA
       FILE": NORMAL : FOR Z = 1 TO
      500: NEXT Z: GOTO 2030
4665  GOSUB 4700: REM  READ AUDIT
       RECORD
4670  IF R$ = "" THEN 4665
4675  GOSUB 10000: REM  GET NEXT
      RECORD
4685  GOSUB 10010:NUM = NUM + 1:R
      EC = REC - 1: REM   INSERT
4695  GOTO 4665
4700  CALL 768,R$
4705  IF R$ = "" THEN  RETURN
4710 K$ =  LEFT$ (R$,4):II$ =  MID$
      (R$,5,23):CC$ =  MID$ (R$,28
      ,4):AA$ =  MID$ (R$,32,7):AC
      $ =  RIGHT$ (R$,2)
4720  RETURN
4900  IF  PEEK (222) <  > 5 THEN
       STOP
4905  PRINT SD$"CLOSE LOG."TI$: GOSUB
      9310: GOTO 2030
5000  IF  PEEK (222) = 6 THEN  VTAB
      12: HTAB 5: FLASH : PRINT  CHR$
      (7)"AUDIT FILE NOT FOUND": NORMAL
      : FOR Z = 1 TO 500: NEXT Z: PRINT
      SD$"CATALOG,S"SA$",D"DA$: GET
      Z$: GOTO 4000
5010  IF  PEEK (222) = 8 THEN  VTAB
      12: HTAB 5: FLASH : PRINT  CHR$
      (7)"AUDIU FILE IS BAD": NORMAL
      : FOR Z = 1 TO 500: NEXT Z: GOTO
      2030
5020  STOP
5100  PRINT SD$"APPEND LOG."TI$",
      S"SA$",D"DA$
5200  PRINT SD$"WRITE LOG."TI$
5300  PRINT R$
5400  PRINT SD$"CLOSE LOG."TI$
5500  RETURN
9000  REM

********.INIT.********************

9005  TEXT : HOME : VTAB 12: FLASH
      : PRINT "INITIALIZATION": NORMAL

9010  REM  ***SET UP CHAIN THRU T
      HE DATA BASE***
9011 SD$ =  CHR$ (13) +  CHR$ (4)

9012 PT$ = ".": REM  DECIMAL POIN
      T
9015 MAX = 400
9020  DIM B$(MAX),ND%(MAX),AD%,SD
      %(12),NC%(MAX),AC%,SC%(99)
9030  REM  ***.CALCULATION OF AVA
      ILABLE MEMORY.***

9031  REM  MEM=FRE(0)-(10+3*MAX)/
      RECLEN
9032  REM  FRE(0) GIVES SPACE AVA
      ILABLE FOR STRINGS BEFORE DI
      MENSIONING B$
9033  REM  B$ NEEDS 10 BYTES FOR
      OVERHEAD + 3 FOR EACH DIMENS
      ION
9034  REM  SUBTRACTING THIS FACTO
      R GIVES SPACE LEFT FOR STRIN
      GS
9035  REM   DIVIDE THIS BY RECORD
       LENGTH(CURRENTLY 40)
9036 REC = ( FRE (0) - (10 + 3 *
      MAX)) / 40: REM       THIS GI
      VES NUMBER OF RECORDS POSSIB
      LE
9037  IF REC > MAX THEN REC = MAX

9038 REC =  INT (REC) - NUM
9040 ND%(0) = 1
9050  FOR I = 1 TO MAX - 1:ND%(I)
       = I + 1: NEXT I
9060 ND%(MAX) = 0
9070 AD% = 1:SD%(0) = 0
9071 NC%(0) = 1
9072  FOR I = 1 TO MAX - 1:NC%(I)
       = I + 1: NEXT I
9073 NC%(MAX) = 0
9074 AC% = 1:SC%(0) = 0
9080 YY$ = "":MM$ = "":DD$ = "":H
      I$ = "":CC$ = "":AA$ = "":AC
      $ = ""
```

MONEY MANAGER

```
 9090 NUM = 0
 9100  PRINT SD$"BLOADINPUT"
 9110  GOSUB 60000
 9120  INPUT "DO YOU WISH THE FILE
       TO BE AUDITED?";AUDIT$
 9130  IF AUDIT$ <  > "Y" THEN  GOTO
       9199
 9140 AUDIT = 1: INPUT "DATE/TIME
       (MM/DD HH;MM)";TI$: INPUT "S
       LOT?";SA$: INPUT "DRIVE?";DA
       $
 9150  PRINT SD$"OPEN LOG."TI$",S"
       SA$",D"DA$
 9152  PRINT SD$"WRITE LOG."TI$
 9154  PRINT TI$
 9160  PRINT SD$"CLOSE LOG."TI$
 9199  GOTO 2000: REM  START MAINL
       INE
 9200  REM


******** TIME ********************



 9210  TEXT : HOME : PRINT "INPUT
       DATE AND TIME(MM/DD HH;MM)":
       INPUT TI$: RETURN
 9300 REC = REC - 1
 9310  VTAB 23: PRINT "

       ": PRINT "RECORDS USED="NUM
       SPC( 5)"RECORDS LEFT="REC: RETURN
 9400  VTAB 5: PRINT  TAB( 5)"YEAR
       " TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "    ";
       : INVERSE : PRINT ">": NORMAL

 9410  VTAB 7: PRINT  TAB( 5)"MONT
       H" TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "  ";:
       INVERSE : PRINT ">": NORMAL

 9420  VTAB 9: PRINT  TAB( 5)"DAY"
       TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "  ";:
       INVERSE : PRINT ">": NORMAL

 9430  VTAB 11: PRINT  TAB( 5)"ITE
       M" TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "
                          ";: INVERSE
       : PRINT ">": NORMAL
 9440  VTAB 13: PRINT  TAB( 5)"COD
       E" TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "    ";
       : INVERSE : PRINT ">": NORMAL

 9450  VTAB 15: PRINT  TAB( 5)"AMO
       UNT" TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "$
         ";: INVERSE : PRINT ">": NORMAL

 9460  VTAB 17: PRINT  TAB( 5)"ACC
       OUNT" TAB( 15);: INVERSE : PRINT
       "<";: NORMAL : PRINT "  ";:
       INVERSE : PRINT ">": NORMAL

 9465  RETURN
 9470  VTAB 5: HTAB 16: PRINT YY$;
       : HTAB 16:T$ = "":MM = 4: GOSUB
       60020
 9480  IF T$ <  > "" THEN YY$ = T$

 9485  IF T$ <  > "" THEN  VTAB 5:
       HTAB 16: PRINT YY$

 9490  VTAB 7: HTAB 16: PRINT MM$;
       : HTAB 16:MM = 2: GOSUB 6002
       0
 9500  IF T$ <  > "" THEN MM$ = T$

 9510  IF  LEN (MM$) = 1 THEN MM$ =
       "0" + MM$
 9515  IF T$ <  > "" THEN  VTAB 7:
       HTAB 16: PRINT MM$
 9520  VTAB 9: HTAB 16: PRINT DD$;
       : HTAB 16:MM = 2: GOSUB 6002
       0
 9530  IF T$ <  > "" THEN DD$ = T$

 9540  IF  LEN (DD$) = 1 THEN DD$ =
       "0" + DD$
 9545  IF T$ <  > "" THEN  VTAB 9:
       HTAB 16: PRINT DD$
 9547 K$ = MM$ + DD$
 9550  IF FCT <  > 1 THEN 9560: REM
         SKIP CHECKS IF NOT ADD
 9551  IF  LEN (K$) < 4 THEN 9490
 9552  FOR I = 1 TO  LEN (K$): IF
       MID$ (K$,I,1) = " " THEN 94
       90: NEXT I
 9560  VTAB 11: HTAB 16: PRINT II$
       ;: HTAB 16:MM = 23: GOSUB 60
       020
 9570  IF T$ <  > "" THEN II$ = T$

 9575  IF  LEN (II$) = 22 THEN II$
       = II$ + " ": GOTO 9595
 9580  IF  LEN (II$) > 22 OR  LEN
       (II$) = 0 THEN 9595
 9590  FOR I = 1 TO (23 -  LEN (II
       $)):II$ = II$ + " ": NEXT
 9595  IF T$ <  > "" THEN  VTAB 11
       : HTAB 16: PRINT II$
 9596  IF  LEN (II$) < 23 AND FCT =
       1 THEN 9560
 9600  VTAB 13: HTAB 16: PRINT CC$
       ;: HTAB 16:MM = 4: GOSUB 600
       20
 9610  IF T$ <  > "" THEN CC$ = T$

 9615  IF  LEN (CC$) = 3 THEN CC$ =
       CC$ + " ": GOTO 9635
 9620  IF  LEN (CC$) > 3 OR  LEN (
       CC$) = 0 THEN 9635
 9630  FOR I = 1 TO (4 -  LEN (CC$
       )):CC$ = CC$ + " ": NEXT I
 9635  IF T$ <  > "" THEN  VTAB 13
       : HTAB 16: PRINT CC$
 9636  IF  LEN (CC$) < 4 AND FCT =
       1 THEN 9600
 9637  FOR I = 1 TO  LEN (CC$): IF
       MID$ (CC$,I,1) = " " THEN 9
       600: NEXT I
 9640  VTAB 15: HTAB 17: PRINT AA$
       ;: HTAB 17:MM = 7: GOSUB 600
       20
 9650  IF T$ <  > "" THEN AA$ = T$

 9655  GOSUB 15000: REM  FORMAT AM
       OUNT
 9656  IF  LEN (AA$) > 7 THEN  PRINT
       CHR$ (7):AA$ = "       ": GOTO
       9640
 9657  IF  LEN (AA$) = 7 THEN 9675

 9670  FOR I = 1 TO (7 -  LEN (AA$
       )):AA$ = " " + AA$: NEXT I
 9675  IF T$ <  > "" THEN  VTAB 15
       : HTAB 17: PRINT AA$
 9676  IF  LEN (AA$) < 7 AND FCT =
       1 THEN 9640
```

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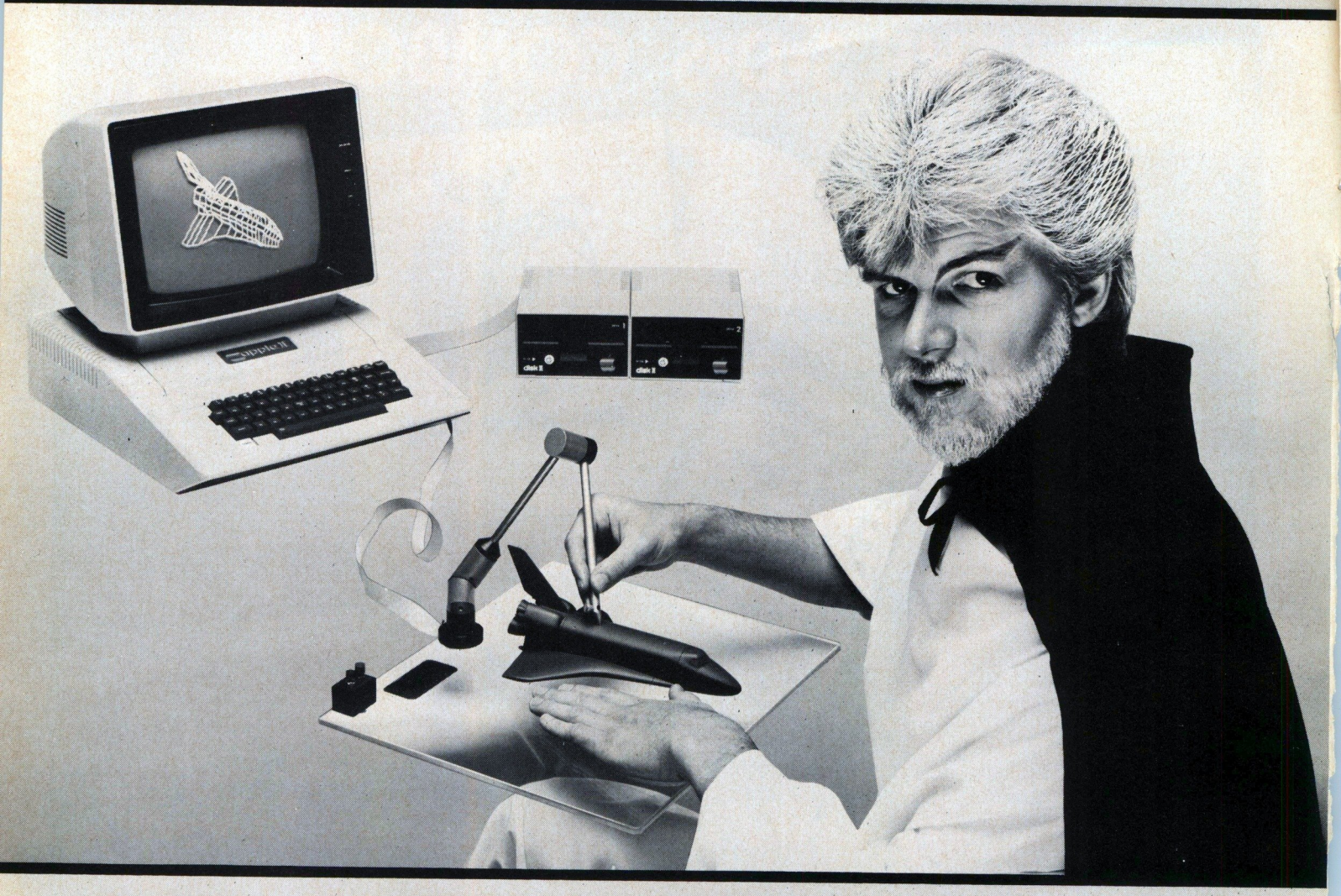

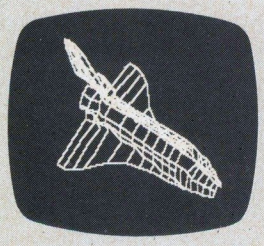

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MCS

MONEY MANAGER

```
9680  VTAB 17: HTAB 16: PRINT AC$
      ;: HTAB 16:MM = 2: GOSUB 600
      20
9690  IF T$ <  > "" THEN AC$ = T$

9700  IF  LEN (AC$) = 2 OR  LEN (
      AC$) = 0 THEN 9715
9710 AC$ = AC$ + " "
9715  IF T$ <  > "" THEN  VTAB 17
      : HTAB 16: PRINT AC$
9716  IF  LEN (AC$) < 2 AND FCT =
      1 THEN 9680
9720  RETURN
9800  REM
***.SEARCH ROUTINE.***

9810  IF M <  > 0 THEN C = SD%(M)
      : GOTO 9840
9820  IF HASH <  > 0 THEN C = SC%
      (HASH): GOTO 9840
9830 C = SD%(0)
9840  IF C = 0 THEN RC = 1: GOTO
      9900
9841 FOUND = 0
9842  IF  RIGHT$ (AA$,3) = ".00" THEN
      AA$ = "": REM    NULL OUT AM
      OUNT IF NOTHING ENTERED
9850  IF MM$ <  > "" AND  LEFT$ (
      B$(C),2) <  > MM$ THEN RC =
      1: GOTO 9900
9860  IF DD$ <  > "" AND  MID$ (B
      $(C),3,2) <  > DD$ THEN  GOTO
      9891
9861 FC$ =  MID$ (B$(C),28,4): IF
      CC$ <  > "" AND FC$ <  > CC$
       THEN  GOTO 9891
9862  IF AA$ <  > "" AND  MID$ (B
      $(C),32,7) <  > AA$ THEN  GOTO
      9891
9863  IF AC$ <  > "" AND  MID$ (B
      $(C),39,2) <  > AC$ THEN  GOTO
      9891
9864  IF II$ <  > "" AND  MID$ (B
      $(C),5, LEN (II$)) <  > II$ THEN
       GOTO 9891
9865 FM$ =  LEFT$ (B$(C),2):FD$ =
       MID$ (B$(C),3,2):FC$ =  MID$
      (B$(C),28,4):FA$ =  MID$ (B$
      (C),32,7):FF$ =  MID$ (B$(C)
      ,39,2):FI$ =  MID$ (B$(C),5,
      23):FOUND = 1
9891  IF HASH = 0 THEN 9895
9892 OHASH = HASH:KD$ = FC$: GOSUB
      10500: REM    HASH THE CODE
9893  IF HASH <  > OHASH THEN RC =
      1: GOTO 9900
9895  IF FOUND = 0 AND M <  > 0 THEN
      C = ND%(C): GOTO 9840
9896  IF FOUND = 0 AND HASH <  >
      0 THEN C = NC%(C): GOTO 9840

9897  IF FOUND = 0 THEN C = ND%(C
      ): GOTO 9840
9900  RETURN
9910  REM
***.CHANGE ROUTINE.***

9911 R$ = ""
9912  IF MM$ = "" THEN R$ = R$ +
      FM$: GOTO 9914
9913  GOTO 9925
9914  IF DD$ = "" THEN R$ = R$ +
      FD$: GOTO 9916
9915  GOTO 9925
9916  IF II$ = "" THEN R$ = R$ +
      FI$: GOTO 9918
9917 R$ = R$ + II$
9918  IF CC$ = "" THEN R$ = R$ +
      FC$: GOTO 9920
9919  GOTO 9925
9920  IF AA$ = "" THEN R$ = R$ +
      FA$: GOTO 9922
9921 R$ = R$ + AA$
9922  IF AC$ = "" THEN R$ = R$ +
      FF$: GOTO 9924
9923 R$ = R$ + AC$
9924 B$(C) = R$: RETURN
9925  VTAB 22: HTAB 10: PRINT  CHR$
      (7); CHR$ (7);: FLASH : PRINT
      "CANNOT CHANGE KEY!!!": NORMAL
      : FOR I = 1 TO 1000: NEXT I:
      RC = 1: RETURN
10000  REM
****.GET NEXT RECORD.*
      ***

10005 C = AD%: IF C = 0 THEN  PRINT
      "NO ROOM TO ADD!":RC = 1: RETURN

10006 AD% = ND%(C):AC% = AD%:RC =
      0: RETURN
10010 B$(C) = R$
10015  IF AUDIT = 1 AND RFWD = 0 THEN
       GOSUB 5100
10020  IF SD%(0) = 0 THEN ND%(C) =
      0:SD%(0) = C:HFLAG = 1: GOTO
      10085
10030  IF  VAL (K$) <  =  VAL ( LEFT$
      (B$(SD%(0)),4)) THEN ND%(C) =
      SD%(0):SD%(0) = C:HFLAG = 1:
       GOTO 10085
10035  IF SD%( VAL ( LEFT$ (K$,2)
      )) = 0 THEN PRES% = SD%(0):H
      FLAG = 1: GOTO 10050
10036 HFLAG = 0
10040 PRES% = SD%( VAL ( LEFT$ (K
      $,2)))
10050 SUC% = ND%(PRES%)
10060  IF SUC% = 0 THEN ND%(PRES%
      ) = C:ND%(C) = 0: GOTO 10085

10070  IF  VAL (K$) <  =  VAL ( LEFT$
      (B$(SUC%),4)) THEN ND%(PRES%
      ) = C:ND%(C) = SUC%: GOTO 10
      085
10080 PRES% = SUC%: GOTO 10050
10085  IF HFLAG = 1 THEN SD%( VAL
      ( LEFT$ (K$,2))) = C
10086 KD$ = CC$: GOSUB 10500: REM
       HASH THE KEY
10090  IF SC%(0) = 0 THEN NC%(C) =
      0:SC%(0) = C:HFLAG = 1: GOTO
      10145
10100  IF (CC$) <  = ( MID$ (B$(S
      C%(0)),28,4)) THEN NC%(C) =
      SC%(0):SC%(0) = C:HFLAG = 1:
       GOTO 10145
10105  IF SC%(HASH) = 0 THEN PRES
      % = SC%(0):HFLAG = 1: GOTO 1
      0120
10106 HFLAG = 0
10110 PRES% = SC%(HASH)
10120 SUC% = NC%(PRES%)
10130  IF SUC% = 0 THEN NC%(PRES%
      ) = C:NC%(C) = 0: GOTO 10145

10140  IF (CC$) <  = ( MID$ (B$(S
      UC%),28,4)) THEN NC%(PRES%) =
      C:NC%(C) = SUC%: GOTO 10145
10142 PRES% = SUC%: GOTO 10120
10145  IF HFLAG = 1 THEN SC%(HASH
      ) = C
```

MONEY MANAGER

```
10147  RETURN
10500  REM    ***.HASHING ALGORITH
     M.***

10510 HO =  ASC ( LEFT$ (KD$,1)) +
     ASC ( RIGHT$ (KD$,1))
10520 HI =  ASC ( MID$ (KD$,2,1))
     +  ASC ( MID$ (KD$,3,1))
10530 HO = HO * HO:HI = HI * HI:H
     T = HO + HI
10540 HA$ =  STR$ (HT):HA$ =  MID$
     (HA$,2,2)
10550 HASH =  VAL (HA$)
10560  RETURN
11000  REM
***.DELETE ROUTINE.***


11010  IF SD%(0) = 0 THEN  RETURN

11020  IF C = SD%(0) AND ND%(SD%(
     0)) = 0 THEN  GOSUB 13000:ND
     %(SD%(0)) = AD%:AD% = SD%(0)
     :SD%(0) = 0: GOTO 11090
11030  IF C = SD%(0) THEN  GOSUB
     13000:TEMP = ND%(SD%(0)):ND%
     (SD%(0)) = AD%:AD% = SD%(0):
     SD%(0) = TEMP: GOTO 11090
11040  IF ND%(SD%(0)) = 0 THEN RC
     = 1: GOTO 12000
11050 LD% = SD%(0):PD% = ND%(SD%(
     0))
11060  IF C = PD% THEN  GOSUB 130
     00:ND%(LD%) = ND%(PD%):ND%(P
     D%) = AD%:AD% = PD%: GOTO 11
     090
11070 LD% = PD%:PD% = ND%(PD%)
11080  IF PD% <  > 0 THEN 11060
11085 RC = 1: GOTO 12000
11090  IF C = SC%(0) AND NC%(SC%(
     0)) = 0 THEN  GOSUB 13000:NC
     %(SC%(0)) = AC%:AC% = SC%(0)
     :SC%(0) = 0: GOTO 12000
11091  IF C = SC%(0) THEN  GOSUB
     13000:TEMP = NC%(SC%(0)):NC%
     (SC%(0)) = AC%:AC% = SC%(0):
     SC%(0) = TEMP: GOTO 12000
11092  IF NC%(SC%(0)) = 0 THEN RC
     = 1: GOTO 12000
11093 LC% = SC%(0):PC% = NC%(SC%(
     0))
11094  IF C = PC% THEN  GOSUB 130
     00:NC%(LC%) = NC%(PC%):NC%(P
     C%) = AC%:AC% = PC%: GOTO 12
     000
11095 LC% = PC%:PC% = NC%(PC%)
11096  IF PC% <  > 0 THEN 11094
11097 RC = 1
12000  RETURN
13000  REM  FIX UP KEY CHAINS
13005 K =  VAL ( LEFT$ (B$(C),2))

13010  IF SD%(K) <  > C THEN 1303
     0
13011 C1 = ND%(C): IF C1 = 0 THEN
     13014
13012 K1 =  VAL ( LEFT$ (B$(C1),2
     ))
13013  IF K = K1 THEN SD%(K) = C1
     : GOTO 13030
13014 SD%(K) = 0
13030 KD$ =  MID$ (B$(C),28,4): GOSUB
     10500
13040  IF SC%(HASH) <  > C THEN 1
     3090
13050 C1 = NC%(C): IF C1 = 0 THEN
     13080
13060 OHASH = HASH:KD$ =  MID$ (B
     $(C1),28,4): GOSUB 10500
13070  IF OHASH = HASH THEN SC%(H
     ASH) = C1: GOTO 13090
13071 HASH = OHASH
13080 SC%(HASH) = 0
13090  RETURN
15000  IF  LEN (AA$) = 0 THEN AA$
     = ".00": RETURN
15005  FOR I = 1 TO  LEN (AA$): IF
     MID$ (AA$,I,1) = PT$ THEN 1
     5020
15010  NEXT I
15015 AA$ = AA$ + PT$ + "00": RETURN

15020  IF  LEN (AA$) - I = 2 THEN
     RETURN
15030  IF  LEN (AA$) - I = 1 THEN
     AA$ = AA$ + "0": RETURN
15040 AA$ = AA$ + "00": RETURN
32000  REM
.***ERROR RECOVERY.***

32001  IF  PEEK (222) = 255 THEN
     : REM  NO ACTION
32002  IF  PEEK (222) = 6 THEN  VTAB
     12: HTAB 5: FLASH : PRINT  CHR$
     (7)"FILE NOT FOUND": NORMAL
     : FOR Z = 1 TO 500: NEXT Z
32003  IF  PEEK (222) = 4 THEN  VTAB
     12: HTAB 5: FLASH : PRINT  CHR$
     (7)"DISC WRITE PROTECTED": NORMAL
     : FOR Z = 1 TO 500: NEXT Z
32004  IF  PEEK (222) = 5 THEN  STOP

32010  POKE 216,0: GOTO 2000
60000 HH$ =  CHR$ (8):HH$ = " " +
     HH$ + HH$: RETURN
60010 TT = 0:MM = 255
60020 T$ = ""
60050  GET C$:AA =  ASC (C$):LL =
     LEN (T$): IF LL = MM AND AA
     <  > 13 AND AA <  > 8 AND A
     A <  > 24 THEN  PRINT  CHR$
     (7); CHR$ (7); CHR$ (7);: GOTO
     60050
60060  IF AA = 21 THEN AA =  PEEK
     ( PEEK (36) +  PEEK (40) +  PEEK
     (41) * 256)
60070  IF AA = 8 AND LL <  = 1 THEN
     60080
60071  IF AA = 8 AND LL = MM THEN
     PRINT  CHR$ (8);:T$ =  LEFT$
     (T$,LL - 1): GOTO 60050
60072  IF AA = 8 THEN T$ =  LEFT$
     (T$,LL - 1): PRINT HH$;: GOTO
     60050
60080  IF AA = 8 AND LL THEN T$ =
     "": PRINT HH$;: GOTO 60050
60090  IF AA = 8 THEN  PRINT " ";
     CHR$ (8);: GOTO 60050
60100  IF AA = 13 THEN  PRINT "":
     RETURN
60110  IF AA = 24 AND LL > 0 AND
     LL < MM THEN  FOR FF = 1 TO
     LL: PRINT HH$;: NEXT FF: PRINT
     " "; CHR$ (8);:T$ = "": GOTO
     60050
60120  IF AA = 24 THEN  GOTO 6005
     0
60260 C$ =  CHR$ (AA)
60270 T$ = T$ + C$
60280  IF AA < 32 THEN  INVERSE :
     PRINT  CHR$ (AA + 64);: NORMAL
     : GOTO 60300
```

MONEY MANAGER

```
60290  PRINT C$;
60310  GOTO 60050


]LIST

10  REM  THIS PROGRAM IS USED IN
    CONJUNCTION
20  REM  WITH THE 'MONEY MANAGER'
    PROGRAM.
30  REM  THIS PROGRAM CHECKS THE
    CODES WHICH ARE
40  REM  TO BE USED IN THE 'CODE'
    FIELD OF THE
50  REM  'MONEY MANAGER' FOR CONF
    LICTS.
100 SD$ =  CHR$ (13) +  CHR$ (4)
200  PRINT SD$"NOMON C,I,O"
210 MAX = 25
300  DIM CODE$(MAX),HASH%(MAX)
400  TEXT : HOME : VTAB 12: PRINT
     TAB( 10)"CODE CHECKER": PRINT
     : PRINT : PRINT  TAB( 5)"COP
     YRIGHT (1982)"
410  PRINT  TAB( 5)"CRITERION SYS
     TEMS": PRINT  TAB( 5)"586 KE
     NT LANE": PRINT  TAB( 5)"SHO
     REVIEW,MN 55112"
420  FOR Z = 1 TO 1000: NEXT Z
500  ONERR  GOTO 32000
510  PRINT SD$"VERIFY DB.CODES"
520  PRINT SD$"OPEN DB.CODES"
530  PRINT SD$"READ DB.CODES"
540  INPUT I: REM  RECORD COUNT
550  FOR J = 1 TO I: INPUT CODE$(
     J): INPUT HASH%(J): NEXT J
560  PRINT SD$"CLOSE DB.CODES"
570  TEXT : HOME : VTAB 12: HTAB
     5: PRINT "SELECT ONE OPTION:
     "
580  PRINT : PRINT : HTAB 20: PRINT
     "1) ADD CODES": HTAB 20: PRINT
     "2) LIST CODES": HTAB 20: PRINT
     "3) EXIT"
582  INPUT O: IF O <  > 1 AND O <
      > 2 AND O <  > 3 THEN 570
584  ON O GOTO 600,585,1050
585  TEXT : HOME : PRINT  TAB( 5)
     "CODE" TAB( 15)"HASH VALUE":
      PRINT  TAB( 5)"----" TAB( 1
     5)"----------"
586  FOR J = 1 TO I: PRINT  TAB(
     5);CODE$(J); TAB( 15);HASH%(
     J): NEXT J
590  VTAB 23: PRINT "HIT ANY KEY
     TO CONTINUE": GET A$: GOTO 5
     70
600  TEXT : HOME : VTAB 12: HTAB
     5: INPUT "CODE ?";CD$
601  IF CD$ = "?" THEN 1000
605  IF  LEN (CD$) = 0 THEN 600
606  IF  LEN (CD$) = 4 THEN 620
610  FOR K = 1 TO (4 -  LEN (CD$)
     ):CD$ = CD$ + " ": NEXT K
620  GOSUB 10500: REM  HASH THE C
     ODE
625  IF I = 0 THEN 650
630  FOR J = 1 TO I: IF HASH%(J) =
     HASH THEN  VTAB 23:: FLASH :
      PRINT  CHR$ (7)"CODE CONFLI
     CT!!": NORMAL : FOR Z = 1 TO
     500: NEXT Z: GOTO 600
640  NEXT J
645  IF I = MAX THEN  TEXT : HOME
     : VTAB 23: FLASH : PRINT  CHR$
     (7)"NO MORE ROOM!!!": NORMAL
     : GOTO 1000
650 CODE$(I + 1) = CD$:HASH%(I +
    1) = HASH:I = I + 1
660  GOTO 600
1000  PRINT SD$"OPEN DB.CODES"
1010  PRINT SD$"WRITE DB.CODES"
1020  PRINT I
1030  FOR J = 1 TO I: PRINT CODE$
     (J): PRINT HASH%(J): NEXT J
1040  PRINT SD$"CLOSE DB.CODES"
1045  GOTO 570
1050  END
10500  REM  ***.HASHING ALGORITH.
      ****

10510 HO =  ASC ( LEFT$ (CD$,1)) +
      ASC ( RIGHT$ (CD$,1))
10520 HI =  ASC ( MID$ (CD$,2,1))
      +  ASC ( MID$ (CD$,3,1))
10530 HO = HO * HO:HI = HI * HI:H
     T = HO + HI
10540 HA$ =  STR$ (HT):HA$ =  MID$
     (HA$,2,2)
10550 HASH =  VAL (HA$)
10560  RETURN
32000  IF  PEEK (222) = 6 THEN  TEXT
     : HOME : VTAB 12: HTAB 5: FLASH
     : PRINT  CHR$ (7)"NO CODE FI
     LE": NORMAL : PRINT SD$"OPEN
      DB.CODES":I = 0: GOTO 570
32050  STOP
```

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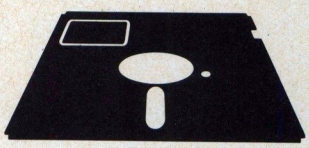
R. D. Purves



WHILE writing a printer utility for a word processor, I encountered some interesting problems in loading text from disk. The outcome was a new DOS 3.3 command LTXT (**L**oad **TeXT**) which combines the versatility of READ with the speed of BLOAD. LTXT is similar in conception to the FILEDUMP command described by Lee Reynolds in *Call -A.P.P.L.E.* June 1982, but puts the text into memory instead of sending it to the current output device. It is four to five times faster than READ/INPUT for bulk loading of text files.

The text files, created by the word processor I was using, are ordinary sequential files with ASCII carriage return characters signifying the end of a paragraph. Initial attempts to access the files with READ and INPUT came adrift immediately because of commas and colons in the text and consequently a stream of EXTRA IGNORED error messages. It is possible to GET characters one-by-one from disk, but as anyone knows who has tried it, GETting more than a few hundred characters from a text file is a tediously slow business.

An "Input Anything" routine offered more promise. As most readers will know, this is a machine code routine which mimics the INPUT statement, but without rejecting commas and colons. Many problems in reading text files are overcome in a straightforward fashion. A well documented account is given by P. Meyer in *Call -A.P.P.L.E. In Depth No.1* "All About Applesoft." Incidentally, Meyer's routine can be considerably shortened by letting the existing ROM routines do more of the work. My version, which fits into only 28 bytes, is shown in listing 1.

. . . neither IAS nor INPUT can cope with paragraphs longer than 255 characters . . .

Unfortunately neither Input Anything nor INPUT itself could cope with paragraphs longer than 255 characters, which is the maximum string length permitted in Applesoft. Even if this limitation could have been sidestepped, tests showed that to input a file of 30000 characters would take more than two minutes. Since the word processor can read its own files in 30 seconds, it was clear that a better method must exist.

At this point, reference to "Beneath Apple DOS" by D. Worth and P. Lechner showed that an appropriate call to the file manager portion of DOS would do the trick. For those who have not yet obtained this book, the file manager is a set of routines intermediate in level between the DOS command interpreter and RWTS (Read or Write a Track/Sector). Roughly speaking, the command interpreter knows how to figure out what you want and then tells the file manager to do it. The file manager in turn works out which disk sectors are involved and instructs RWTS accordingly. Finally RWTS takes charge of the disk hardware to read or write the sectors. As you proceed down the chain of command, the routines become more versatile but harder to provide with the right information.

Trials with a clumsy machine language driver program to call the file manager proved successful, and the last step was to make some changes to the command interpreter to create the previously mentioned new command LTXT.

As a personal opinion, I have reservations about altering DOS and other standard system programs. Such changes tend to propagate from disk to disk with sometimes very disconcerting results. (How many readers know that a disk INITed while the Program Line Editor is active has an altered DOS on it? A fresh boot from such a disk puts the DOS buffers and HIMEM $600 bytes lower than normal, even if PLE is not subsequently loaded.) To avoid these surprises, LTXT disables the INIT command. Any attempt to INIT will give a SYNTAX ERROR.


```
]LIST

100  REM     INPUT ANYTHING

              BY R.D. PURVES

110  REM  USAGE:- CALL INPT,SVAR$

120 INPT = 768:: FOR J = INPT TO
     INPT + 27: READ K: POKE J,K:
      NEXT : DATA 32,190,222,32,2
     27,223,32,108,221,133,133,13
     2,134,32,111,253,32,57,213,2
     00,162,141,32,233,227,76,154
     ,218
```

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Brian Matthews

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TEXT FILE FAST LOADER

Listing 2 shows how LTXT is activated. The DOS command table and keyword (parameter) table are changed, then the LTXT routine itself overwrites memory formerly used by the file manager's INIT code.

With sequential files, the syntax of the LTXT command is: LTXT filename,Aa,Ll[,Bb,Ss,Dd,Vv] where the A (address) parameter specifies an address in memory where loading is to occur and the L (length) parameter indicates the number of bytes to be loaded. The optional B (byte) parameter specifies how many bytes are to be skipped in the file before loading commences. A default value of zero is assumed. S, D and V are the usual slot, drive and volume numbers and are also optional. If you use LTXT in a program, don't forget the preliminary Ctrl-D as a DOS "waker-upper".

The . . . B parameter specifies how many bytes are to be skipped . . .

Usually we will want to load the whole of a file without knowing what its length is. In this case it suffices to specify a length parameter greater than the file's actual length, since LTXT stops loading automatically at the end of the file. Thus you can set the L parameter to a huge value like 30000 even if the file is only a few bytes long. Prior to loading the text, LTXT puts zeros ($00) into memory, from the starting address to (starting address + requested length +1). Subsequently when you are processing the text in memory, the first occurence of $00 acts as a flag, to warn you that you have reached the end of the file. LTXT does not check that the A and L parameters point to a "safe" part of memory; *poor choices for these values can lead to DOS being overwritten,* with distressing consequences.

Once loaded, text information is accessible by machine language programs or by a succession of PEEKs. Note that characters retrieved from disk by LTXT have their m.s.b. set, so that A is CHR$(193), not CHR$(65).

However, in many applications it is more convenient to create Applesoft string variables containing the text. To avoid losing the speed advantages of LTXT, a short machine language routine (listing 3) can be used to scan through the file after it has been loaded into memory, creating ordinary string variables with their m.s.b. off. A demonstration of this routine, named MAKSTR, is shown in listing 4. The string can be assigned to any string variable (simple or array). The original hex data is not altered or moved by MAKSTR, which makes its own copy of each character string.

MAKSTR is relocatable . . .

Like Input Anything, MAKSTR is relocatable and can be placed anywhere you have 61 free bytes, merely by altering the value of MAKSTR in line 110.

```
]LIST

100  REM           LTXT

               BY R.D. PURVES

110 T$ = "A884:4C 54 58": REM
     CHANGE INIT TO LTXT
120 T$ = T$ + " NA909:20 7F": REM
      ALLOW PARMS A,L,B,R,S,D,V;
     DISALLOW NEW-FILE CREATION
130 T$ = T$ + " N9D1E:8D AE": REM
     ADDRESS-1 OF PATCH
140  GOSUB 500
150 T$ = "AE8E:20 26 A5 A2 03 8E
     BB B5 CA 8E BC B5 AD 6C AA 8
     D C1 B5 38 6D 72 AA 85 50 AD
      6D AA 8D C2 B5 6D 73 AA 85
     51 AD 72 AA 85 85 AD 73 AA 8
     5 86 A9 00 A8 91 85 E6 85 D0
      02 E6 86 A6 85 E4 50 D0 F2
     A6 86 E4 51 D0 EC 4C 85 A3"
160  GOSUB 500: PRINT : PRINT "LT
     XT IS LOADED AND WILL REMAIN
      PART": PRINT "OF DOS UNTIL
     YOU REBOOT"
170  END
500 T$ = T$ + " ND9C6G": FOR J =
     1 TO  LEN (T$): POKE 511 + J
     , ASC ( MID$ (T$,J,1)) + 128
     : NEXT : POKE 72,0: CALL  -
     144: RETURN
```

```
]LIST

100  REM           MAKSTR

               BY R.D. PURVES

110 MAKSTR = 768: FOR J = MAKSTR TO
     MAKSTR + 60: READ K: POKE J,
     K: NEXT
120  DATA 32,190,222,32,227,223,3
     2,108,221,133,133,132,134,16
     0,0,177,0,41,127,153,0,2,170
     ,240,15,201,13,240,11,200,20
     8,239,162,0,142,255,2,169,25
     4,168,133,2,200,230,0,208,2,
     230,1,136,208,247,152,160,2,
     32,233,227,76,154,218
130  INPUT "GIVE DECIMAL ADDRESS
     (TRY 53456):";ADDR
140  POKE 1,ADDR / 256: POKE 0,AD
     DR - 256 *  PEEK (1)
150 :
160  PRINT : PRINT : PRINT "START
     ING ADDR = " PEEK (0) + 256 *
      PEEK (1)
170  PRINT
180  CALL MAKSTR,A$: PRINT A$
190  PRINT
200  PRINT "LENGTH = " LEN (A$) TAB(
     20)"RFLAG = " PEEK (2)
210  PRINT
220  PRINT "GIVE DECIMAL ADDRESS"
     : INPUT "OR  PRESS (RETURN)
     TO GO ON:";ADDR$
230  ON ADDR$ = "" GOTO 160:ADDR =
      VAL (ADDR$): GOTO 140
```

When a string is constructed from hex data in memory, there can be three outcomes from a scan: a) a normal string is found, terminated by a carriage return character, b) a string is terminated by the end-of-file marker ($00), or c) after 255 bytes have been incorporated into the string, the 256th byte is not a carriage return or $00. This last case occurs frequently in word processor files and occasionally in files made from DOS WRITE and PRINT commands. On exit, MAKSTR leaves a return-flag value in location $02. The three possible values of this flag, corresponding to a), b) and c) above are 13,0 and 254. Thus the result of the string conversion can be tested by a pair of IF statements: IF PEEK(2) = 0 THEN you've reached the end-of-file. IF PEEK(2) = 254 THEN Applesoft's string variables are too small for the string characters in the file, and you'll have to treat two or more consecutive strings as one block of text.

```
:ASM
                    ********************************
                    *                              *
                    *    MAKSTR by R. D. PURVES    *
                    *                              *
                    * Call -A.P.P.L.E. : Sept. 1982 *
                    *                              *
                    ********************************
                    *
                    * Constructs a string from data at (PNTR)
                    * then advances PNTR for next string
                    *
                    CHKCOM   EQU  $DEBE       ;CHECK FOR COMMA
                    PTRGET   EQU  $DFE3       ;FIND VARIABLE
                    CHKSTR   EQU  $DD6C       ;CHECK FOR STRING$
                    MAKST    EQU  $E3E9       ;MAKE-A-STRING
                    SAVD     EQU  $DA9A       ;SAVE DESCRIPTOR
                    *
                    FORPNT   EQU  $85
                    PNTR     EQU  $0          ;ADDRESS OF DATA IN MEMORY
                    RFLAG    EQU  $2          ;RETURN FLAG
                    *
                             ORG  $300        ;DECIMAL 768 FOR CALL
0300: 20 BE DE               JSR  CHKCOM
0303: 20 E3 DF               JSR  PTRGET
0306: 20 6C DD               JSR  CHKSTR      ;ERROR IF NOT STRING$
0309: 85 85                  STA  FORPNT
030B: 84 86                  STY  FORPNT+1    ;SAVE ADDR OF DESCRIPTOR
030D: A0 00                  LDY  #$0
030F: B1 00         LOOP     LDA  (PNTR),Y    ;READ CHAR
0311: 29 7F                  AND  #$7F        ;SET MSB OFF
0313: 99 00 02               STA  $0200,Y     ;PUT IN BUFFER
0316: AA                     TAX              ;SAVE AS POSSIBLE STOP-CHAR
0317: F0 0F                  BEQ  EXIT        ;END IF $00 OR $80...
0319: C9 0D                  CMP  #$0D        ;OR CARRIAGE RETURN
031B: F0 0B                  BEQ  EXIT
031D: C8                     INY
031E: D0 EF                  BNE  LOOP
0320: A2 00                  LDX  #$00        ;STOP-CHAR. FOR MAKST
0322: 8E FF 02               STX  $02FF       ;PRETEND A $00 WAS READ
0325: A9 FE                  LDA  #$FE
0327: A8                     TAY              ;FOR INC LOOP INDEX
0328: 85 02         EXIT     STA  RFLAG       ;RETURN FLAG = 0,13 OR 254
032A: C8                     INY
032B: E6 00         INCL     INC  PNTR        ;ADVANCE PNTR
032D: D0 02                  BNE  NOINC
032F: E6 01                  INC  PNTR+1
0331: 88            NOINC    DEY
0332: D0 F7                  BNE  INCL
0334: 98                     TYA              ; 0 => A
0335: A0 02                  LDY  #$2         ;A,Y POINT AT BUFFER $200
0337: 20 E9 E3               JSR  MAKST       ;BUF -> STRING STORAGE
033A: 4C 9A DA               JMP  SAVD        ;SAVE DESCRIPTOR AT (FORPNT) AND EXIT


--End assembly--

61 bytes

Errors: 0
```

TEXT FILE FAST LOADER

Lastly, there is a question of random-access files. Since in theory the disk formats of sequential and random access files are the same, LTXT should work equally well for either type. With the same syntax given earlier, LTXT loads L bytes from a random access file, starting from the beginning (record 0). Furthermore, you can skip over a given number of records before loading, if a preliminary OPEN command is given with a L parameter to tell DOS the record length. In this case an R (record) parameter is used with LTXT, just as with the READ command. LTXT automatically closes the file after loading.

LTXT worked satisfactorily on a number of random access files, but would sometimes stop short after loading only a fraction of the requested length. It turned out that

. . . DOS had another pitfall for me . . .

DOS had another pitfall for me, in the form of "holes" in random access files. A hole is 256 consecutive bytes which a) have never been written to and b) correspond exactly with a disk sector. If you have a record length of 100 and you write a single character to records 0 and 10, then the 999 byte gap between these two characters includes two holes (bytes 256-511 and 512-767). DOS refuses to allocate disk space to holes until you write some data to the relevant part of the file. The DOS manual alludes somewhat obliquely to this quirk on page 129. When LTXT encounters a hole in a file, it stops loading, under the impression that end-of-file has been reached.

Although it is possible to fill in the holes in a pre-existing random access file, care is needed to preserve data. It is easier to avoid holes right from the outset by writing a single return character to each and every sector that the file may ultimately use. If the record length is RL and you plan a total of NS sectors, then the following code will prevent holes:

```
10 PRINT D$"OPEN FILENAME"
20 FOR BYTE = 0 TO RL*NS
   STEP 256
30 PRINT D$"WRITE FILENAME,
   B"BYTE
40 PRINT
50 NEXT BYTE
60 PRINT D$"CLOSE"
```

A useful side-effect is that since all the file's sectors are now allocated, you cannot get a DISK FULL error while writing to a record in the middle of the file.

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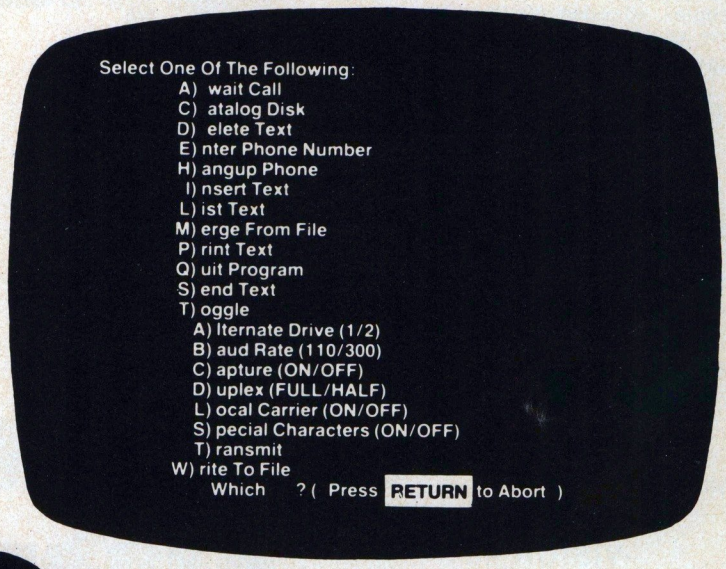

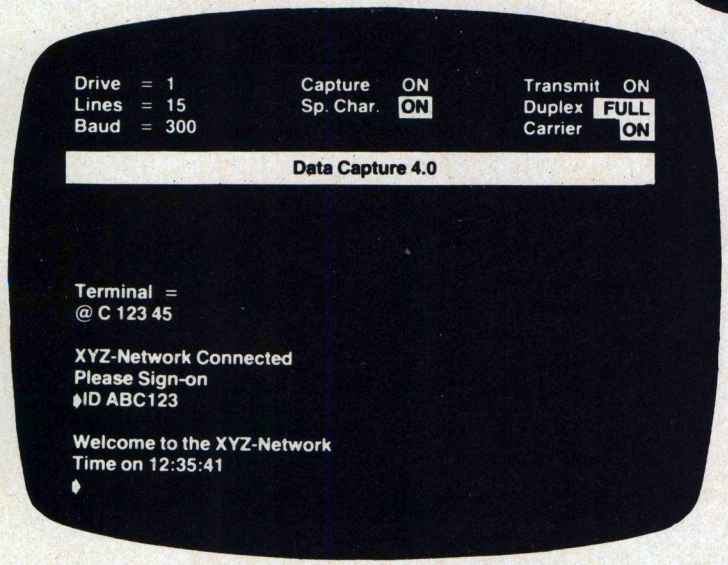

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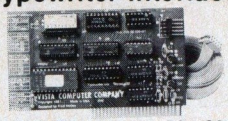

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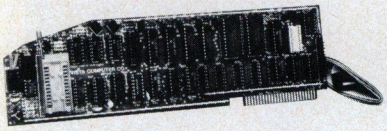

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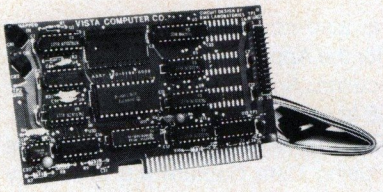

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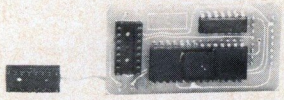

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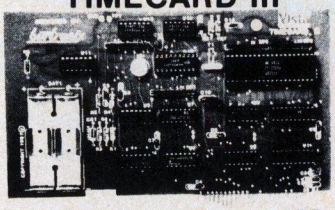

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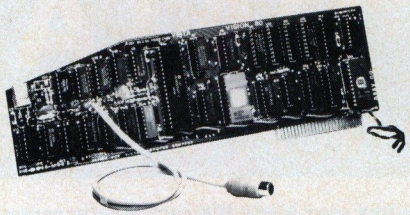

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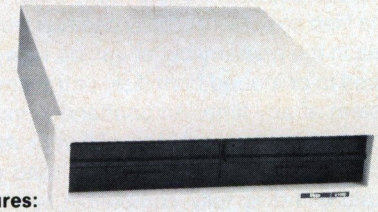
V-1000



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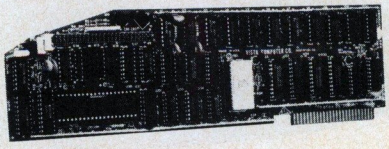

- High speed DMA transfer of data (1 micro-second/byte)
- Documentation provided — includes theory of operation and diskettes
- Uses all standard Apple DOS commands (OPEN, CATALOG, LOCK, DELETE, LOAD, ETC.) except for INIT which has been improved and enhanced in a Vista format routine
- Compatible with Apple DOS 3.3, Pascal 1.1 and CPM 2.2 (with the Z80 soft card by Microsoft)
- 2K x 8 PROM contains Autoboot functions and all eight-inch floppy driver code allowing complete compatibility with Apple DOS 3.3

Suggested price **$595.00**

A Call —A.P.P.L.E. BOOK REVIEW:

APPLE PASCAL A HANDS-ON APPROACH

Lee A. Webster/Reviewer

Apple Pascal a hands on approach
by Arthur Luehrmann
and Herbert Peckham

McGraw-Hill, Inc.,
1220 Avenue of Americas
New York, NY 10020 *$14.95*
(1981, 431 pp.)

I should start with a disclaimer—which is the coward's way to begin. I don't have Apple Pascal (i.e. the language card) on my Apple at home, *but* I do have it available on an Apple at work. If you are familiar with Apple Pascal, you know that in addition to the hardware you get when you plunk down your dollars, you also get a box of books! This includes some of the usual well-done Apple reference manuals for Pascal, but not a tutorial like they give you for Integer Basic or Applesoft. Hence (another cowardly admission) I have been reluctant to dive into all those books to learn Pascal—I like to be led by the hand through new territory.

Well, this brings me (finally!) to the subject of this review—a *tutorial* book to learn Pascal on the Apple. This book looks like an Apple manual (almost the same size, spiral binding) except for the orange and yellow cover. There are 14 chapters and 430 pages which lead you through the material including the Editor and Pascal language.

First, let's look at the chapter titles—it will give you an idea of the approach taken by the authors:

1. Getting Started
2. Typing in Programs—The Editor
3. Writing, Running, and Changing Programs
4. Generating Sound
5. Inventing New Words: Procedures
6. More Invented Words: Functions
7. Drawing Pictures
8. Branching Statements: IF and CASE
9. String Variables and WHILE Loops
10. Number Types and Arithmetic
11. Scalar Data Types and Sets
12. Arrays
13. Records and Files
14. Recursion

Each chapter is called a "Session" by the authors, with the idea that it should take you about two hours to proceed through the material. It is designed to be done while sitting at the Apple keyboard. The writing style is conversational and easy to follow. Each session begins with a brief introduction, a statement of the goals, sections on the new topics, a summary, and questions/problems (with answers to odd numbered problems at the back of the book).

Since you are supposed to be working right along with the text, your instructions are clearly shown in bold-face type, step-by-step. You learn by doing and by trying—then the authors explain what happened and why. At times, you're even directed to make pre-meditated errors. (horrors!!) just to see what happens. Common error traps and important details are highlighted in boxes within the text.

As you can see by the list of chapter titles, the Editor is taught right along with Pascal—a little at a time as needed to input, correct, and modify the programs. Sound generation and graphics are included early in the book. Bottom up programming is used until the 12th chapter, and you do not get to use real numbers (non-integer) until chapter 10.

I found the approach to be very good—after all it's been test "driven" by many students under the author's direction. It is suited to the self-learning method (either for individuals or in educational institutions), although it might not work logistically in a classroom or laboratory situation with a student at each Apple reading, trying, reading, etc. This latter approach might tie up the equipment too long unless there are adequate numbers of computers available. There are times in the book when material is repeated—a good idea for many learners, but annoying to those who got it the first time.

Finally, the book concludes with appendixes covering how to get Pascal going on one or two disk systems, tables of reserved words, built-in names, command structure, size and quantity limits, differences between version 1.0 and 1.1, a comprehensive index, and a list of compiler error messages. This review concludes with a recommendation that you get and use a copy of this book if you want to learn Pascal on the Apple. It should get you started, then you'll be able to understand the Apple Reference Manuals!!

Yea, from the table of my memory, wipe away all trivial fond records
...Hamlet: Act I, Scene 5

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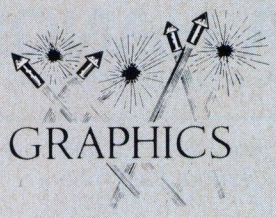

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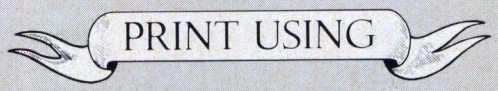

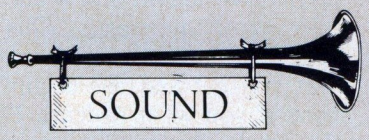

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Additional library disks titled **"Ampersoft Program Library"** are already available.

Some of the other routines in The Routine Machine (plus others not listed) are:

SWAP: Swaps two string or numeric values.

TEXT OUTPUT: Prints with no "word break" on screen.

STRING OUTPUT: Input any string, regardless of commas, etc.

ERR: Stack fix for Applesoft ONERR handling.

GOTO, GOSUB: Allows computed statements. Example: **GOTO X ✳5** or **GOSUB X ✳5.**

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RESET HANDLER: Treats RESET with ONERR; or will RUN or reboot disk.

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FREE SPACE ON THE SCREEN

Mike Firth

FREE Space information is something I need occasionally, but not often enough to modify the DOS (*Call -A.P.P.L.E.* April 82), and I frequently have already used most of the other common spaces (i.e. 768), the & vector, and just below DOS. So where can I put it that is always free anytime I want to get the free space?

This routine runs on the screen! It would be possible to safely place any routine that takes 120 bytes or less on the screen (or more with a JUMP and careful placement). A routine that is longer than 120 bytes would stomp the eight bytes that are off the screen and which are sometimes used by the slots.

NOTE: For the routine at 8828 to work, there must be no spaces in the string.

```
]
]LIST

10  REM

  FREE SPACE ON THE SCREEN

MIKE FIRTH : CALL -A.P.P.L.E.

100  GOSUB 8820: END
8820  HOME : REM  FREE SPACE
8821 Q$ = "72,152,72,138,72,32,24
     7,175,169,0,133,68,133,69,16
     2,140,160,8,189,242,179,10,1
     44,6,230,68,208,2,230,69:136
     ,208,244,202,208,236,165,69,
     240,16,56,165,68,233,100,133
     ,68,165,69,233,0":Q = 1024
8822  GOSUB 8828
8823 Q$ = "69,233,0,133,69,232,16
     ,236,32,142,253,160,2,138,32
     ,70,174,200,185,84,4,9,128,3
     2,237,253,201,141,208,243,10
     4,170,104,168,104,96,32,70,8
     2,69,69,32,83,69,67,84,79,82
     ,83,141,127,127,0,0":Q = 102
     4 + 48
8824  GOSUB 8828: VTAB 22: CALL 1
     024: INPUT "RETURN ";Q$: RETURN

8828  FOR J = 1 TO  LEN (Q$):Q1 =
     VAL ( MID$ (Q$,J)): POKE Q,
     Q1:Q = Q + 1:J = J +  LEN ( STR$
     (Q1)): NEXT : RETURN
```

```
]
]LIST

10  REM

FREE SPACE AND FILEDUMP POKER

PUMP/GOLDING/WELMAN/REYNOLDS/EDGE

100 HEX$ = "BA69:A0 C8 18 B9 F2 B
     3 F0 E A 90 FB 48 E6 40 D0 2
      E6 41 68 18 90 F0 88 D0 E9
     A6 40 A5 41 AC 6 E0 D0 3 4C
     24 ED 4C 1B E5": GOSUB 900
110 HEX$ = "B3AF:BD C5 C3 C1 D0 D
     3 A0 C5 C5 D2 C6 A0 N ADB9:E
     A A9 0 85 40 85 41 20 69 BA"
     : GOSUB 900
200 HEX$ = "BCDF:20 8E FD 20 A3 A
     2 20 8C A6 F0 12 20 ED FD AD
      0 C0 10 F3 8D 10 C0 20 1B F
     D C9 91 D0 E9 20 FC A2 60 N
     A8E7:46 49 4C 45 44 55 4D D0
      N 9D48:DE BC N A933:20 30":
      GOSUB 900: END
300  REM

ANY KEY IN FILEDUMP PAUSES OUTPUT
CTRL-Q ABORTS OUTPUT

900 HEX$ = HEX$ + " N D9C6G": FOR
     I = 1 TO  LEN (HEX$): POKE 5
     11 + I, ASC ( MID$ (HEX$,I,1
     )) + 128: NEXT : POKE 72,0: CALL
      - 144: RETURN
```


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STAYING COOL

HARRY Brawley's "Keeping Your Cool", *Call —A.P.P.L.E.*, May 1982, was quite well received and resulted in our **ApCoolKit** as well as a number of letters dealing with the subject. Two letters, from Sutton Redfern and Edward Kurtz, Jr., are reproduced here, along with Mr. Brawley's responses.

The article in the May issue of *Call –A.P.P.L.E.* by Mr. Brawley on "Keep Your Cool" was very interesting. I believe, however that he has missed a very important problem when a fan is installed inside the case of an Apple.

He comments that the most promising commercial solution is M & R's Sup "R" Fan, which like his, is mounted inside the Apple and in the same place so far as I understand his diagram. I recently installed the M & R fan in my Apple in anticipation of adding a Videx Videoterm 80-column board and the Soft Video Switch. When I received the Videx equipment, I found that the fan would not permit the installation of the Soft Switch because the fan extended over the motherboard at the same place where the switch had to be installed. I then purchased the R.H. Electronics Super Fan II which mounts on the outside of the case and will never interfere with any accessories that might be added.

I have been very pleased with the performance of the Super Fan, and despite Mr. Brawley's criticism that it does not produce turbulent flow, it does its job of keeping the Apple cool. After installing the Videx equipment, a short period elapsed before I installed the Super Fan II. During this period my Apple would overheat and stop working. Since installation of the Super Fan II, absolutely no problems with overheating have occurred.

Although I am a firm do-it-yourselfer, in this instance I feel that the commercial fan products are a much better solution. Some of them offer better options such as a switch, pilot light and auxiliary outlet(s). Furthermore, I would recommend only fans that mount outside the Apple. I have only one criticism of the performance of the M & R fan; it did lead to a problem of installing other accessories.

Mr. Redfern raises the important question of making sure there are adequate clearances before adding internal accessories to the Apple][computer.

Unfortunately, Mr. Redfern misunderstood my diagrams. If he checks "Keep Your Cool" Figures 2 and 3, he will see that there is **no** *extension of my fan over the Apple motherboard. Consequently, there is no physical interference possible with board mounted accessories. In point of fact, I have installed both the Videx Videoterm board and the Soft Switch in my machine!*

Mr. Redfern also missed the point I raised in discussing internally vs. externally mounted fans. Simply put, the internal fan, properly positioned, will do a better job than an externally mounted one for the reasons stated in the article and illustrated in Figure 2. If Mr. Redfern is willing to settle for less performance from his cooling system in exchange for the convenience of an external fan, that's his decision.

The issue of "options" such as switches, lights and auxiliary outlet is irrelevant. My article presented a solidly engineered and economically attractive approach to extending the life of the Apple computer. It was not intended to address an Apple][owner's possible need for a plugstrip.

I'd like to comment on the article "Keep Your Cool" by H.E. Brawley, Jr. and R. A. Kidder in the May 1982 issue of *Call –A.P.P.L.E.* I have had experiences with two fans now in my Apple Computer, and your readers should find my experience valuable. I installed a fan in my Apple about a year ago. It was, in fact, the same type recommended by Brawley and Kidder. It fitted neatly inside the computer, and blew air into the computer. After about a week, I inspected the inside of the computer, and discovered to my horror that oil from the bearings of the fan was leaking out and was thrown all over the inside of the computer. I cleaned up the mess (big job), returned the fan, and got a refund. I then decided that, as a matter of policy, all fans installed in my computer should be exhaust fans; i.e., pull out air rather than push in air. Actually, that is the way it is done on the "big computers," and now I know why.

I've now installed an external exhaust fan which is working beautifully. The fan itself is rectangular computer-type fan sold by Radio Shack. Less expensive ones are available from mail order houses, but I was lazy. I built a cardboard housing around it — strictly Rube Goldberg — but it works very well. I also ran the power line through a light-dimmer switch which I use to control the speed and noise. I have a thermometer inside the computer on top of the power supply, and I find that with the fan running so slowly that it is almost inaudible, the thermometer indicates a temperature only five degrees above the room temperature. I have the fan behind the computer, out of sight. I used to worry about the quality of the air seal between the cardboard fan housing and the computer, but have found that this seal is not critical.

My theory of computer cooling is much simpler than that presented by Brawley and Kidder. I assume that the computer was designed to be cooled by natural convection, and that it will be very adequately cooled if I keep to a low value the ambient air temperature surrounding the components. I think that five degrees above room temperature is quite adequate. Finally, use an *exhaust fan;* do not blow air and who-knows-what-else into the computer!

Like Mr. Redfern, Mr. Kurtz missed my point concerning the difference between internally mounted fans and those attached to the outside of the computer case. Figure 1 of my article shows the problem with the Apple][computer. Air drawn out through slots at the top will pull air up principally along the sides of the case. What air is drawn across the board will be done in a smooth "laminar" flow that won't disturb the pockets of localized hot air produced by the integrated circuits mounted on the motherboard. Further, no air will be moved across the under side of the board, which is an important cooling surface, too.

Consider Figure 2. Observe the scrubbing action of the air as it is thrown across the motherboard, both above and below. This turbulent flow is necessary to break up the insulating local concentrations of hot air that form around heat producing components on a horizontal surface. Obviously, a thermometer placed on top of the power supply (see Figure 3 for reference) can't measure the temperature rise where it counts, on the motherboard itself.

It's unfortunate that Mr. Kurtz had bad luck with oil leaking from his first fan choice. In my article, I suggested buying (new, not surplus!) the high quality, industrial grade Torin fan specifically to avoid this kind of problem.

By the way, "big computers" usually mount component boards vertically, so that gravity can keep the warm air moving, whether or not there is additional forced circulation. Thus, they avoid the principal fault in the Apple][packaging design. I've seen other computers use fans both ways, drawing air in and pushing it out, and in most cases it was done as part of what appeared to be a careful thermal design job. No such effort, Mr. Kurtz' hopeful assumption to the contrary, was made with our beloved Apple][, and my article was intended to correct this oversight in the most effective way possible.

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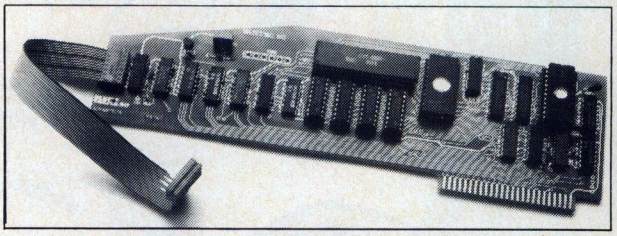

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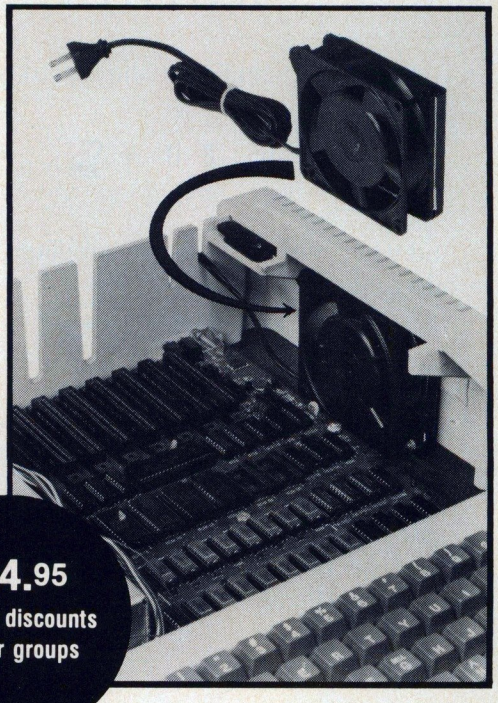

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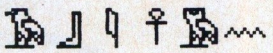
CLEVER CLEO

Cleo was quite a girl! To a lover in Rome she had to write in Roman:

ROMAN

To her subjects in Egypt she had to write in hieroglyphics:



And when she wrote to the Israelites, she obviously had to use Hebrew:

דוד בא

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A FOURTH SWITCH INPUT

Joel Buckley

I began to write this article with a fair degree of uncertainty over whether it would ever grace the pages of an Apple computer magazine. Many editors today tend to look aghast at the prospect of a pristine Apple computer being despoiled by the hot thrusts of a soldering iron. However, my Apple warranty has long expired, and being a hardware hacker from way back, I feel no such trepidation about taking my heated tool in hand. A few modifications to correct some rather glaring deficiencies in the Apple (lack of keyboard lower case, lack of lower case display, and RESET disable) have gained a fairly wide degree of acceptance. This article is about a relatively minor hardware modification — one which provides a fourth switch input for the Game Paddle I/O connector.

Background

The Game Paddle I/O connector provides a means for a comparatively quick and easy connection to the Apple switches, outputs, paddles, joysticks, some types of printer interfaces and modems, AC remote controllers, and just about anything else a creative tinkerer can think of. The normal connections provided on the connector are: +5 volts, ground, strobe, four analog (paddle) inputs, four outputs, and three switch inputs.

Now why, you might ask, are there only three switch inputs when there are four of everything else? If there were four switch inputs, then you could have four game paddles, each with its own pushbutton input, and the entire family could play four way pong. Or you could have two X–Y joysticks, each with separate Phaser and Photon Torpedo controls.

The Modification (With or Without Solder)

The reason there isn't a fourth switch input on the Game Paddle I/O connector is that the fourth hardware input is used for cassette data input. But, and here's the nice part about the modification, *there is nothing to prevent the cassette data input from also being used as a switch input.* Please refer to figure 1. It shows the relevant part of the Apple schematic. The modification, simply a one wire jumper, is shown as a dotted line.

The inputs to the 74LS251 (a multiplexer) are normally high. The inputs are pulled low by being shorted to ground, typically through a normally–open pushbutton switch. While reading a tape, the 741 Op Amp varies the input at Pin 4 from high to low. Since this input floats high when there is no cassette being read, a switch can also be attached to it without being affected by the dormant cassette input. As long as the switch is open, cassette tapes can still be read in the normal manner.

The figure shows the new switch input connected to Pin 16 of the Game Paddle I/O connector. This is just one of the two unused pins on the connector (Pin 9 is the other one). The *cleanest* modification can be made by a simple point to point wire soldered at J14–16 and H14–4 on the underside of the Apple printed circuit board. If you do not want to solder to your Apple, you can make the connection by simply running a wire between two 16 pin IC sockets inserted into J14 and H14.

Using the Fourth Switch Input

Obviously, for this modification to be of any use, you have to add a switch to it. This is done with wiring attached to a 16 pin IC header to be inserted into the Game Paddle I/O socket. Typically, this will consist of a normally–open pushbutton switch wired between the input (J14–16) and ground (J14–8). Actually, any type of switch can be used—just remember that it must be open for cassette tapes to be read.

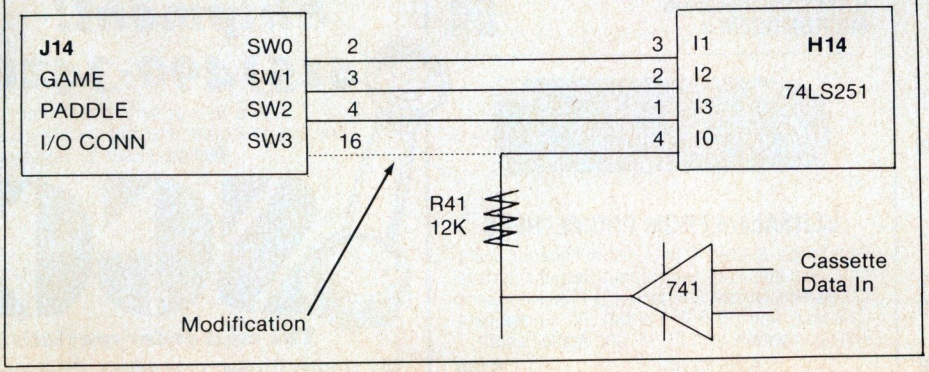
Reading the fourth switch input is done the same way as the other three. PEEKing the appropriate address will give a value greater than 127 if the given input is high, and less than 128 if the input is low. The address of the fourth input is -16288 ($C060).

Summary

This is a very simple modification. It provides relatively minor benefit — a single extra switch input. Even if you are not into four–player switch and paddle games, an extra single bit input may come in handy. As another application, I suggest this switch assignment: inputs 0 and 1 for the game paddles, input 2 for a shift key indicator, and input 3 (the fourth switch input) for a control key indicator. With appropriate software, this setup can enable the Apple to be used as a full upper and lower case keyboard.

So, if you have an application that could use another switch input, go to it! Remember, by using a pair of IC sockets, this modification can be done in a completely reversible fashion.

Figure 1. A Jumper From H14-4 To J14-16 Provides The Apple II With A Fourth Switch Input



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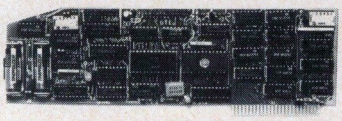

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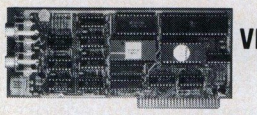

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ADVENTURES WITH A RAMCARD

Charles Kluepfel

NO, this is not about how to load *Ulysses and the Golden Fleece* onto your language card, but it represents the results of some trial-and-error explorations on the use of a RAMcard. Just as an adventure game, you sometimes do not know what commands will work or why, but further investigation leads to a solution.

First of all, what uses are there for a RAM card? It provides an additional 16K of RAM space that takes the place, conceptually, of the BASIC ROMs on your motherboard when activated. Being RAM rather than ROM, it can hold whatever is put into it, and its uses include:

1. Running Pascal, or other languages from the Language System, or the alternate BASIC (Integer on an Apple II plus).
2. Holding DOS so that more RAM space is available in the lower 48K for user programs (see *Call -A.P.P.L.E.,* July/August, 1981, pp.9–21 and November/December, 1981, pp.81–85).
3. It can be used by word processors or other machine language programs which relocate themselves onto the card so that more memory is available for data in the lower 48K.
4. The motherboard ROMs can be copied to RAM for patching of undesirable characteristics (more on this later).

Note that conspicuous by its absence is the loading of BASIC programs onto the RAM card. The reason is that in order for BASIC (INT or FP) to run, the interpreter must fetch bytes from the program being interpreted, thus the processor (the 6502) must fetch instructions from the interpreter residing in the address space $D000–$F7FF and, under control of those instructions, fetch pieces of the user program, being treated as data by the interpreter. If these were to reside in the same set of addresses (address space, as it is called), but a different bank, they could not be accessed, as only one bank of memory range can be available for retrieval of information at any given time.

Of course you could go back and use the Tape/Disk Applesoft interpreter that resides in lower memory, beginning at $800, but that would involve problems of its own, beyond the scope of this article. Another avenue that someone might wish to pursue is some elaboration of CHARGET (see *Call -A.P.P.L.E.,* March, 1982, pp.21–24) to reside in lower (48K) RAM to switch banks back and forth when fetching program pieces from upper RAM (switching back to the motherboard before returning to the caller—the FP interpreter) and to span the $C000-$CFFF gap. (Recall that these memory addresses do not exist either on the motherboard or on the RAM card, and the RAM card only gets its 16K by having two set of $D000-$DFFF addresses, bank switched, as the whole 16K is switched from RAM card to motherboard).

Before embarking on such an adventure, however, be warned of other possible pitfalls, such as one that quickly comes to mind: string data values can point to within an Applesoft program, and if that is on the RAM card, data fetching will have to switch banks sometimes; if you have a 32K or larger RAM card, you might wish to relocate the interpreter onto an alternate 16K bank to put such a patch in. For the less adventurous, we will save enough memory just by relocating DOS onto the RAM card, and limit our modifications of Applesoft to something less extravagant.

This brings us to the fourth use listed above: relocating the contents of the motherboard ROMs onto the RAM card for the purpose of patching them (modifying them to work in a more desirable way)—specifically, to eliminate the conversion of lower case input to upper case, and to correct a problem in the use of data field three in Applesoft.

The following commands, if entered from the keyboard or EXECed from a text file, will remove some bugs from the system:

```
CALL -151
C081
C081
D000 < D000.FFFFM
FD82:EA EA
3D0G
IF PEEK(-8192) = 76 THEN
  POKE -9466,16
  POKE -16256,0
```

(Listing 1 shows a convenient program to use in generating short EXEC files such as this from keyboard input, and Listing 2 for listing the contents if you later forget. I prefer these to *ad hoc* programs for specific files.)

The CALL -151 puts the machine into the monitor where the C081 C081 causes that hex location to be accessed twice. As that location is a "soft switch"—not a real part of memory—it activates any RAM card (or the first 16K—or rather 12K, as only one $D000-$DFFF bank is active —of a larger RAM card) in slot 0 for writing. This means that any fetches of instructions or data will still be from the motherboard, so that the monitor can still be utilized, but storing of data into high memory is to the RAM card. The D000<D000.FFFFM looks peculiar. If you are familiar with the monitor commands, you see it is a memory move, but it moves a block of memory to itself—Ah, but not really itself! It is the same address range, but remember the receiving locations are on the RAM card, and the sending locations are on the motherboard for this same address range because of the double access to $C081. After the transfer, the motherboard BASIC and Monitor are available on the RAM card as well.

Next, FD82: EA EA puts NOP machine language instructions over the two bytes that would ordinarily convert lower case to upper case. On most Apples, the keyboard cannot generate lower case letters, so the conversion is not necessary. But if you have modified the keyboard to generate lower case, you undoubtedly also have modified the display to successfully display them, and conversion to upper case is definitely undesirable—thus this patch.

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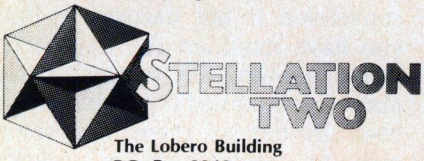

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RAMCARD

Then 3D0G returns to BASIC, as a comparison needs to be made, and comparisons cannot be done via the monitor. The IF statement, valid for both BASICs, checks for which version of BASIC is in use, using the same byte DOS uses in response to INT and FP commands to see which is present. If indeed it finds the Applesoft interpreter, a patch is made to get rid of the effects of a bug in the PRINT statement that surfaces when commas are used to separate items to be printed.

Such PRINT statements in effect divide the screen into three zones, of sizes 16, 16 and 8 characters. Sometimes the interpreter decides not to use the third zone, and goes directly to the first zone of the following line. The method of decision works out to be somewhat peculiar: if the item printed in the second zone on the line would be too big to fit into the third zone, the item actually designated for the third zone is held over to the next line, regardless of how small it itself is. If the item in zone 2 is small enough so that it would fit even in zone 3, the interpreter will attempt to fit even larger items into zone 3, which could result in spilling data over into the next line.

The interested reader may wish to look at the code for the PRINT statement (starting at $DAD5, but looping back to slightly before that). It turns out that to correctly implement three print zones would involve rewriting a large section of the interpreter, but by changing one byte ($DB06 to $10), the third print zone is effectively eliminated, and two zones of 16 and 24 positions remain.

After the appropriate patches are made, POKE -16256,0 write protects the card and leaves its copy of the monitor and FP interpreter in control of the system (read enables the card). You can then PRINT "ABCDEFGH", "IJK", "LMNOPQRSTUVWXYZ" without worry, and use lower case letters without fear. (By the way, having PLE installed usually gets around the uppercase conversion problem, but if part of PLE was disconnected with PR#1 or such, or all by REMOVE PLE, the above patch is necessary.)

You can, however, lose your patches. To understand why, we need to look at the architecture of available RAM cards:

Some RAM cards have a switch that sticks through the back of the Apple that determines what will happen when you press RESET. Such is the Saturn 32K RAM card, on which, if the switch is down, RESET will cause the motherboard ROMs to be activated even if you had been accessing the RAM card all along; if the switch is up and the RAM card is write protected, more specifically not available at all or available only for the fetching of data, not storage, then RESET causes no change of bank, so that you stay on the bank (RAM or motherboard) you had been working on. If, however, the RAM card is write-enabled, leaving the switch up makes RESET cause the RAM card to be active for fetches of data, even if the motherboard had been active for such memory reads.

Other RAM cards, such as the Legend 64KC, lack the switch, and behave like the Saturn card with its switch down, always reverting to the motherboard ROMs on RESET.

To avoid losing our patch on hitting RESET (which I have a habit of using as faster and more reliable in exiting an Applesoft program than Ctrl C), if your card has a switch, you would probably think the UP position should be used. The Saturn card's instructions advise leaving the switch up while using Pascal, but down otherwise. One wonders why, as this involves flipping the switch when going from one environment to the other and checking the switch on system turn-on. Also, as I like to use the RESET key, why should I let it force me to the motherboard ROMs if I was using the RAM card up till then. When using my favorite word processor, RESET quickly gets me out of editing into the main menu, but with the switch down, RESET disastrously ends the program.

The problem of having to flip the switch probably is not a difficult one, as evidenced by those cards that lack the switch. I believe that Pascal will operate correctly with the switch down if the Apple has an Autostart ROM on the motherboard or the 16K card is the original language card, which will do the correct thing and reboot on RESET. Only for Apples with the original monitor on the motherboard would switch-up be a

necessity. Still...to avoid the problems of RESET in the word processor or using a patched monitor and interpreter (or the alternate BASIC), it would be nice it the switch could be left UP rather than DOWN all the time.

To see why Saturn recommends leaving the switch down for ordinary use, if you have a card whose switch works like that on the Saturn card, turn the computer off, then on again to assure garbage in the RAM card, boot a disk that has an unmodified DOS 3.3 but does not load the alternate BASIC on the RAM card, such as an initialized slave that does *not* have a copy of the 3.3 Master HELLO program.

With the switch up, press RESET. Result:—dead system—turn it off, then on again to resurrect. It turns out that DOS 3.3, upon booting, write enables the RAM card so it can store $00 into the recognition character for the version of BASIC, in order that DOS will not later think that a given BASIC is present because of accidental presence of the flag character. However, it never bothers to write protect the card, and so remains write enabled (usually until an INT or FP command is given or the 3.3 Master HELLO program loads, then write-protects the card. With the switch up on the Saturn card, RESET then causes memory fetches to be from the card, but there is nothing there, so there is no monitor, nor even a valid branch address for the RESET, and we branch to Never-Never land. What is called for is a patch to DOS so that it will have the decency to write protect the RAM card before the boot has ended. (This will in no way affect the ability to install the alternate BASIC, as the Master HELLO program write enables the card for that purpose, regardless.)

Indeed the "feature" of DOS that write-enables the card and places the $00 onto it, resides in a patch area of DOS ($BFC8-$BFD8 in a 48K machine) that has three unused bytes which could be used to write-protect the card (STA $C082). The return from the patch is:

BFD6: 4C 44 B7 JMP $B744

which is followed by three unused bytes. To fix the problem, DOS should be changed to load the following:

BFD6: 8D 82 C0 STA $C082
BFD9: 4C 44 B7 JMP $B744

These six bytes are stored on the diskette DOS in track 0, sector 9, bytes $D6-$DB (the first byte in a sector is byte 0, remember). (See *Call -A.P.P.L.E.,* Feb. 1981, p.11 for the correspondences of memory location and track/sector.) On a master diskette, the JMP is to $3744, and the last byte of the new version should be $37, when using DISK ZAP or a user-devised program using RWTS to update the diskette directly, rather than INITialize a new diskette with the patched DOS.

Many users find that the insertion of $00 into the BASIC recognition byte is undesirable to begin with as, if this byte has a valid value, the correct BASIC is most likely in place. The patch given on p.7-3 of *Beneath Apple DOS* gets rid of the placement of $00 by NOPing the actual storing, but still leaves the write-enabling of the card. As the entire purpose of the original patch was to put the $00 in place, a better solution would be to avoid branching to the patch at all.

The jump to the patch is located at $B741 in a 48K machine. If that jump is replaced by its original function of a JSR $FE93, the RAM card will not be write-enabled to begin with. This change is also independent of slave/master status, thus if bytes $41-$43 of track 0, sector 1 are changed to 20 93 FE the diskette will boot up without affecting the RAM card (these load into $B741-$B743 on a 48K machine).

If you plan to get a RAM card and presently have an Integer card, be sure to BSAVE ORIG MON, A$F800,L$800 from Integer Basic in case you want ot use the original monitor for single-stepping, etc. When INTBASIC is loaded onto the RAM, it includes a copy of the Autostart monitor. (It does include Programmers" Aid #1 and the mini-assembler, as they are below $F800). Then when you get your RAM card, you can BLOAD your old monitor:

FP
CALL -151
C081
C081
3D0G
BLOAD ORIG MON
INT (this also write protects the card)

This assumes an Apple][plus with INTBASIC already loaded on the RAM card. By the way, if you had a standard Apple][with an Applesoft card, you could turn it into an Apple][plus by interchanging the six ROMs on the card with the four or five on the motherboard (depending on whether the Programmers Aid was there) and the motherboard's previously empty ROM sockets. This is especially useful if Applesoft is your most used language, so that it need not be reloaded from disk each time it is to be used.

Some RAM cards come with routines to relocate DOS onto the card, but many are not compatible with PLE. As the July/August 1981 *Call -A.P.P.L.E.* contains one that is compatible, I have ordered Anthology disk vol. 6. In preparation I wished to modify the Renumber program as per p.11 of that issue. Be careful that you are using the correct version of Renumber, or the addresses won't match those in the article. The addresses given there are for the Renumber found on the DOS 3.3 system master. You may be using, as I am, one Muffined from 3.2, if you had made the prior corrections, for avoiding problems with * followed by numerics, and did not want to go through that correction process again (right; although Renumber was modified before inclusion on the 3.3 master, it does not include the correction of the previously known bug; see *Call -A.P.P.L.E.* October, 1981, p. 76 for the 3.3 corrections).

As a final note on RAM cards: the larger (more than 16K) RAM cards do not use one standard method of switching among 16K banks. The accessing of the first 16K bank is standard, following the conversion set by the original Language Card, using $C080-C083 and $C088-C08B as soft switches. A 32K card can and does get by using soft switches in the remaining addresses from $C080-C08F for the alternate bank. There are no further locations available for slot 0 soft switches, so cards larger than 32K must use a different scheme and in fact do so, even for the second 16K, thus making incompatibility between software written for one type of card and another.

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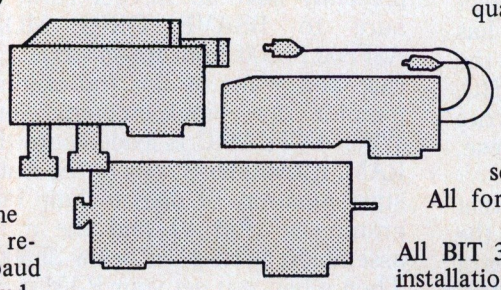

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Anthony Rose

EACH time BASIC wants a character from your program, it jumps to $B1 to get it. If you put vectors to your routine there, you can do all sorts of wonderful things apparently at the same time as your BASIC program is running. This is the routine named CHRGET, whose operation was explained in detail by Cornelis Bongers in the March 1982 *Call –A.P.P.L.E.*

This is a simple setup and restore part of the routine which will enable you to have a routine that is called each time BASIC gets a character. The first few lines (up to the RTS) set up the pointers in the BASIC CHRGET subroutine to point to the second part, which is your routine, in this case, a simple matter of clicking the speaker. The X & Y registers should, if changed, be restored to their value on entry. The last few lines do what the first few bytes of CHRGET would have done had we not interfered. Do try this routine – it makes a marvelous noise and lets you hear by the frequency just how fast your program is running. For instance,

```
10  FOR I = 1 TO 10000:NEXT
```

gives a slowly changing high–pitched tone, while

```
10  A = SIN(X):GOTO 10
```

gives a low buzz, leading you to the conclusion that one iteration of an empty FOR–NEXT loop executes in less time than a sine.

```
:ASM
                        ********************************
                        *                              *
                        *   Program to do Something    *
                        *   between statements in a    *
                        *   running BASIC program.     *
                        *                              *
                        *      by  Anthony Rose        *
                        *                              *
                        * Call -A.P.P.L.E. : Sept 1982 *
                        *                              *
                        ********************************
                        *
                        CHRGET    EQU   $B1
                        CHRGOT    EQU   $B7
                        TXTPTR    EQU   $B8
                        *
                                  ORG   $300
                        *
0300: A9 0D                       LDA   #<BEGIN
0302: 85 B2                       STA   CHRGET+1
0304: A9 03                       LDA   #>BEGIN
0306: 85 B3                       STA   CHRGET+2
0308: A9 4C                       LDA   #$4C
030A: 85 B1                       STA   CHRGET
030C: 60                          RTS
                        *
                        ********************************
                        * Insert your routine here...  *
                        ********************************
                        *
030D: 2C 30 C0          BEGIN     BIT   $C030
                        *
                        ********************************
                        * Return to BASIC              *
                        ********************************
                        *
0310: E6 B8                       INC   TXTPTR
0312: D0 02                       BNE   NOTZERO
0314: E6 B9                       INC   TXTPTR+1
0316: 4C B7 00          NOTZERO   JMP   CHRGOT

--End assembly--

25 bytes

Errors: 0
```

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REMSAVER

Eric Lambrecht

A lot of REM–removers have been published lately. The same instructions are found in each of these similiar programs: 1) save the original version, before stripping off the REMS and 2) then save your new version under another name.

REMSAVER is much more economical! All you do is save the REMs of your program in a textfile, and then save the program without the REMs. This is advantageous as it takes up less space, and you can list the REMs out to the printer, or to the screen as you desire. If you want the REMs back in your program, just load the program and EXECute the REMs–file.

REMSAVER is very easy to use. Load the program with the REMs, and then BRUN REMSAVER. When asked for a name, just type in the name you want. You can safely use the same name as the program had before, because the file that will be created will have the given name plus ".REMS" added. Then you can follow how the REMs are written out to the disk. When the file is CLOSEd, you can use your REMremover, cruncher, ... as you like and SAVE the new version.

This program is not very complicated. After inputting a name and moving it safely to the location "NAME," a texfile is OPENed. Being as the OPEN command is not a direct command, a 0 is stored to $76 (118), so that DOS believes that an Applesoft program is running. The program then searches for the byte $B2 (which is the code for the Applesoft token REM). When a REM is encountered, the line is listed out to the disk. I could not use the Applesoft LIST routine as it does a jump to BASIC at the end, or continues an Applesoft program.

Neither of these situations are desirable here. I therefore took part of the routine and made it come back to me after the listing. At the same time, I eliminated the Applesoft "format" of the listed line in order to get a continuous line. When the end of the program is reached, the file is CLOSEd and that's it.

If you want to save the REMs of a lot of programs, you may wish to set up the ampersand vector, so that you do not have to BRUN REMSAVE every time. To do this, type in the following :

CALL -151 [Cr]
***3F5:4C 00 94 [Cr]**
***3DOG [Cr]**

Now you can call REMSAVER by typing & and a carriage return.

```
:ASM
                    ********************************
                    *                              *
                    *  REMSAVER  by Eric Lambrecht *
                    *                              *
                    * Call -A.P.P.L.E. : Sept.1982 *
                    *                              *
                    ********************************

                    ADR       EQU   $06
                    TXTTAB    EQU   $67
                    FORPNT    EQU   $85
                    LOWTR     EQU   $9B
                    FAC       EQU   $9D
                    INBUFF    EQU   $200
                    BASIC     EQU   $3D0
                    INLIN     EQU   $D52C
                    LSTOUT    EQU   $D72C
                    OUTDO     EQU   $DB5C
                    LINPRT    EQU   $ED24
                    CROUT     EQU   $FD8E
                    COUT      EQU   $FDED


                              ORG   $9400


9400: A2 00                   LDX   #0          ; ask name for file
9402: BD 06 95      ASKNAM    LDA   NAMES,X
9405: F0 06                   BEQ   NAMIN
9407: 20 ED FD                JSR   COUT
940A: E8                      INX
940B: D0 F5                   BNE   ASKNAM
940D: 20 2C D5      NAMIN     JSR   INLIN
9410: A2 FF                   LDX   #$FF
9412: E8            MOVOUT    INX               ; move name
9413: BD 00 02                LDA   INBUFF,X    ; from input buffer
9416: F0 05                   BEQ   REMPL       ; to 'NAME'
9418: 9D 39 95                STA   NAME,X
```

REMSAVER

```
941B: D0 F5      40              BNE   MOVOUT
941D: A9 0F      41   REMPL      LDA   #<REMS       ; add '.REMS'
941F: 85 06      42              STA   ADR          ; to it
9421: A9 95      43              LDA   #>REMS
9423: 85 07      44              STA   ADR+1
9425: A0 00      45              LDY   #0
9427: B1 06      46   REMPL2     LDA   (ADR),Y
9429: 9D 39 95   47              STA   NAME,X
942C: F0 04      48              BEQ   REMEND
942E: C8         49              INY
942F: E8         50              INX
9430: D0 F5      51              BNE   REMPL2
9432: A9 00      52   REMEND     LDA   #0           ; make DOS believe that
9434: 85 76      53              STA   $76          ; a program is running
9436: A2 00      54   FILOP      LDX   #$00         ; and
9438: BD 15 95   55              LDA   OPEN,X       ; open a textfile
943B: F0 06      56              BEQ   WRIT-3       ; with the given name
943D: 20 ED FD   57              JSR   COUT
9440: E8         58              INX
9441: D0 F5      59              BNE   FILOP+2
9443: 20 F3 94   60              JSR   NAMEPR
9446: A2 00      61   WRIT       LDX   #0
9448: BD 28 95   62              LDA   WRITE,X
944B: F0 06      63              BEQ   WRIT2
944D: 20 ED FD   64              JSR   COUT
9450: E8         65              INX
9451: D0 F5      66              BNE   WRIT+2
9453: 20 F3 94   67   WRIT2      JSR   NAMEPR
9456: 20 8E FD   68              JSR   CROUT
                 69   *
                 70   *
9459: A5 67      71              LDA   TXTTAB       ; make 'ADR' point to
945B: 85 06      72              STA   ADR          ; begin of program
945D: A5 68      73              LDA   TXTTAB+1
945F: 85 07      74              STA   ADR+1
9461: A0 01      75              LDY   #1
9463: 4C 88 94   76              JMP   NWLIN2
                 77   *
                 78   *
9466: A0 03      79   COMPAR     LDY   #$03
9468: C8         80   NXT        INY
9469: B1 06      81              LDA   (ADR),Y      ; check every byte
946B: F0 0F      82              BEQ   NWLIN        ; 00 = end of line
946D: C9 B2      83              CMP   #$B2         ; is it a REM ?
946F: D0 F7      84              BNE   NXT          ; no, next byte
9471: A5 06      85              LDA   ADR          ; yes, make 'LOWTR'
9473: 85 9B      86              STA   LOWTR        ; point to begin of line
9475: A5 07      87              LDA   ADR+1        ; and list the line
9477: 85 9C      88              STA   LOWTR+1
9479: 20 9F 94   89              JSR   LIST
                 90   *
947C: A0 00      91   NWLIN      LDY   #$00         ; make ADR point
947E: B1 06      92              LDA   (ADR),Y      ; to next line
9480: AA         93              TAX
9481: C8         94              INY
9482: B1 06      95              LDA   (ADR),Y
9484: 86 06      96              STX   ADR
9486: 85 07      97              STA   ADR+1
9488: B1 06      98   NWLIN2     LDA   (ADR),Y      ; end of program ?
948A: D0 DA      99              BNE   COMPAR       ; no, continue
                100   *
948C: A2 00     101   END        LDX   #0           ; yes, close the file
948E: BD 31 95  102              LDA   CLOS,X
9491: F0 06     103              BEQ   END2
9493: 20 ED FD  104              JSR   COUT
9496: E8        105              INX
9497: D0 F5     106              BNE   END+2
9499: 20 F3 94  107   END2       JSR   NAMEPR
949C: 4C D0 03  108              JMP   BASIC        ; back to basic
                109   *
                110   *
949F: A0 02     111   LIST       LDY   #$2          ; applesoft subroutine
94A1: B1 9B     112              LDA   (LOWTR),Y    ; to list a line
94A3: AA        113              TAX                ; pointed to by
94A4: C8        114              INY                ; LOWTR.
```

```
94A5:  B1 9B      115           LDA  (LOWTR),Y  ; Changed to list
94A7:  84 85      116           STY  FORPNT     ; 'screenwide'
94A9:  20 24 ED   117           JSR  LINPRT     ; and to return
94AC:  A9 20      118           LDA  #'         ' ; afterwards
94AE:  A4 85      119  LIST1     LDY  FORPNT
94B0:  29 7F      120           AND  #$7F
94B2:  20 5C DB   121  LIST3     JSR  OUTDO
94B5:  C8         122           INY
94B6:  B1 9B      123           LDA  (LOWTR),Y
94B8:  D0 07      124           BNE  LIST2
94BA:  20 8E FD   125           JSR  CROUT
94BD:  20 8E FD   126           JSR  CROUT
94C0:  60         127           RTS
94C1:  10 EF      128  LIST2     BPL  LIST3
94C3:  38         129           SEC
94C4:  E9 7F      130           SBC  #$7F
94C6:  AA         131           TAX
94C7:  84 85      132           STY  FORPNT
94C9:  A0 D0      133           LDY  #$D0
94CB:  84 9D      134           STY  FAC
94CD:  A0 CF      135           LDY  #$CF
94CF:  84 9E      136           STY  FAC+1
94D1:  A0 FF      137           LDY  #$FF
94D3:  CA         138           DEX
94D4:  F0 07      139           BEQ  LIST4
94D6:  20 2C D7   140  LIST5     JSR  LSTOUT
94D9:  10 FB      141           BPL  LIST5
94DB:  30 F6      142           BMI  LIST5-3
94DD:  A9 20      143  LIST4     LDA  #'         '
94DF:  20 5C DB   144           JSR  OUTDO
94E2:  20 2C D7   145           JSR  LSTOUT
94E5:  30 05      146           BMI  LIST6
94E7:  20 5C DB   147           JSR  OUTDO
94EA:  D0 F6      148           BNE  LIST4+5
94EC:  20 5C DB   149  LIST6     JSR  OUTDO
94EF:  A9 20      150           LDA  #'         '
94F1:  D0 BB      151           BNE  LIST1
                  152  *
                  153  *
94F3:  A2 00      154  NAMEPR    LDX  #0         ; subroutine to
94F5:  BD 39 95   155           LDA  NAME,X     ; print out the
94F8:  F0 08      156           BEQ  NAMEND     ; name of the file
94FA:  09 80      157           ORA  #$80
94FC:  20 ED FD   158           JSR  COUT
94FF:  E8         159           INX
9500:  D0 F3      160           BNE  NAMEPR+2
9502:  20 8E FD   161  NAMEND    JSR  CROUT
9505:  60         162           RTS
                  163  *
                  164  *
9506:  8D         165  NAMES     HEX  8D
9507:  CE C1 CD
950A:  C5 A0 BA
950D:  A0         166           ASC  "NAME : "
950E:  00         167           HEX  00
950F:  AE D2 C5
9512:  CD D3      168  REMS      ASC  ".REMS"
9514:  00         169           HEX  00
9515:  8D 84      170  OPEN      HEX  8D84
9517:  CD CF CE
951A:  C3 AC C9
951D:  AC CF      171           ASC  "MONC,I,O"
951F:  8D 8D 84   172           HEX  8D8D84
9522:  CF D0 C5
9525:  CE A0      173           ASC  "OPEN "
9527:  00         174           HEX  00
9528:  8D 84      175  WRITE     HEX  8D84
952A:  D7 D2 C9
952D:  D4 C5 A0   176           ASC  "WRITE "
9530:  00         177           HEX  00
9531:  8D 84      178  CLOS      HEX  8D84
9533:  C3 CC CF
9536:  D3 C5      179           ASC  "CLOSE"
9538:  00         180           HEX  00
                  181  NAME      EQU  *


--End assembly--     313 bytes      Errors: 0
```

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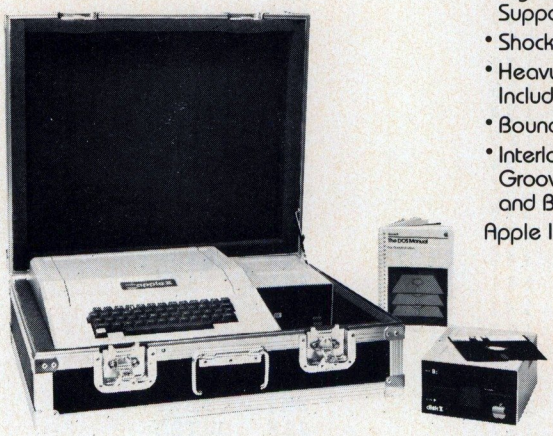

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USING MAC.LC WITH FIRMWARE CARD

David Deever

I had no more than purchased my RAM card when along came Dave Morganstein's article (May *Call —A.P.P.L.E.)* on how to get DOS to recognize a ROM card in slot 4. Neat! Next came Big Mac.LC with a DOS command (ASSEM) to activate it when desired. (By the way, the actual command is ASSE, replacing INIT, and the M satisfies the syntax requirement of a file name. ASSEMBLE, ASSERTION, and many others work just as well.)

So! Now I want to have my cake and eat it too. Why not Applesoft on board, Integer in slot 4, and Big Mac.LC in slot 0, obtained by FP, INT, and ASSEM, respectively. Well, I couldn't seem to make it work. What I could do was the two DOS patches shown in the assembly listing. They may be patched into track 1, sector 4 and track 0, sector 1, with a disk utility program.

The former is the DOS routine that sets the language ROM to the desired BASIC, and the latter is an unused portion of the INIT routine which Mac disables.

(You should make sure your Big Mac.LC is one with slave DOS rather than master DOS before you do this. Use the edit function of DISK ZAP to disassemble the sector. If you see a lot of $37— addresses you have a master version. Apply the correction given in the July *Call –A.P.P.L.E.*, page 75, first.)

Now, using the commands FP, INT and ASSEM, you can switch easily back and forth between either BASIC and Big Mac.LC

```
A5B2: CD 00 E0
A5B5: F0 0E
A5B7: 8D 81 C0
A5BA: 8D C1 C0
A5BD: CD 00 E0
A5C0: F0 03
A5C2: 4C 4A B7
A5C5: 60


B74A: 8D 80 C0
B74D: CD 00 E0
B750: F0 0E
B752: 8D 81 C0
B755: 8D C0 C0
B758: CD 00 E0
B75B: F0 03
B75D: 8D C1 C0
B760: 60
```

```
                *********************************
 2              *                               *
 3              * Using Big Mac.LC with a slot  *
 4              * 4 firmware card (INT or FP)   *
 5              *                               *
 6              * by David C. Deever with Val   *
 7              * J Golding & Dave Morganstein  *
 8              *                               *
 9              * Call -A.P.P.L.E. : Sept 1982  *
10              *                               *
                *********************************
12              *
13              * This routine replaces original
14              * DOS "Set ROM to desired BASIC"
15              * section with new code, then
16              * jumps to unused section of the
17              * disabled INIT routine in Big
18              * Mac's modified DOS...
19              *
20              RAMREAD  EQU  $C080
21              RAMOFF   EQU  $C081
22              FIRMON   EQU  $C0C0
23              FIRMOFF  EQU  $C0C1
24              BASIC    EQU  $E000
25              *
26                       ORG  $A5B2       ;Track 1, Sector 4
27              *
28              * Routine is entered with
29              * recognition byte in accu.
30              *
31                       CMP  BASIC       ;Compare recog. byte
32                       BEQ  OK1         ;Same language
33                       STA  RAMOFF      ;Turn off RAMcard
34                       STA  FIRMOFF     ;and firmware card
35                       CMP  BASIC       ;Match motherboard?
36                       BEQ  OK1         ;Yes, done
37                       JMP  PART2       No, out of space here
38              OK1      RTS
39              *
40                       ORG  $B74A       ;Track 0, Sector 1
41              *
42              PART2    STA  RAMREAD     ;Try RAMcard
43                       CMP  BASIC
44                       BEQ  OK2         ;Found Mac, go home
45                       STA  RAMOFF      ;Not RAMcard, try
46                       STA  FIRMON      ;firmware card
47                       CMP  BASIC
48                       BEQ  OK2         ;That's got it
49                       STA  FIRMOFF
50              OK2      RTS
51              *
52              * Patch to DOS with a disk
53              * utility or BLOAD from Mac's
54              * Exec mode. You now have 3
55              * DOS "language" commands:
56              * FP, INT and ASSEM.

--End assembly--     43 bytes       Errors: 0
```

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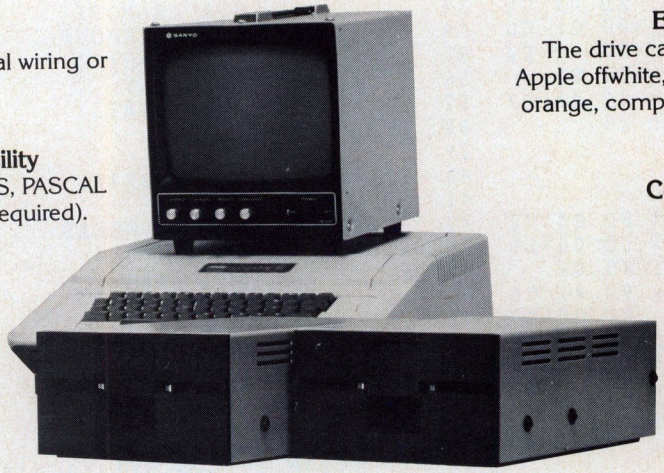

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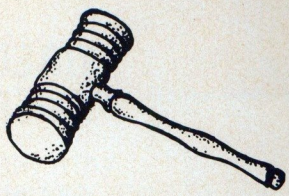
A.P.P.L.E. MEETING MINUTES



Michael Thyng/Regular Guest Secretary

July 20, 1982
Omega Computers, Bellevue

MEETING started promptly at 7:30. Members came in from as far away as Santa Barbara, Bellingham, and Renton. Minutes for May 1982 were approved as published.

Hosts: Jeff and Dave at Omega in Bellevue.

Old Business:

Group purchase of continuous forms (fan fold printer paper. Michael Thyng said he had talked with the nice man at Data/Forms, Inc. about putting together a group purchase. Members said their most popular choices for use were (by size):

14 7/8 x 11
8½ x 11
9½ x 11

Mike will get prices from Data/Forms and report on this at the next meeting.

There will be a swap meet held by Northwest Computer Society, August 19, 1982. Dick Hubert suggested that we join with them for a joint swap. The Northwest Computer Society Chairman, Daily Mc Hugher, said that it will be at 7:30 the third Thursday in the library at Seattle University. Dick Hubert said we will be mailing an announcement about the event.

We are working on hooking up the Source. We have made arrangements with Source to get into a special menu for A.P.P.L.E. Eventually you will be able to download programs from the Source directly over the phonelines.

New Business: None.

Committee Reports: None.

The business portion of the meeting concluded at 7:41.

Q & A

Surge protection
Chips coming up
Spike protection

Speaker

The guest speaker was Wayne Erickson, from the University of Washington. Wayne talked to us about Data Base Management. He explained that there are three types:

Relational
Networking
Hierarchical

Wayne had worked for years on a data base project that NASA used in the Space Shuttle program. Now he has a very fancy version of the same data base called Micro Rim.

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- ASSEMBLER TEACHER exposes the mysteries of hexadecimal, two's complement, character and other data representations, instantly translating from any version to all others.
- ASSEMBLER TEACHER gives you the concepts you need to cope with assembler, using simple on-line lessons that grab you by the keyboard and make you play your way to knowledge.
- ASSEMBLER TEACHER is written by John Fairfield, a Ph.D. in Computer Science who regularly teaches assembler. A RAM Mini-Assembler is included.

"Rating: A . . . a great help to anyone interested in learning machine language programming . . . and the price is right."
Peelings II (Jan. '82)

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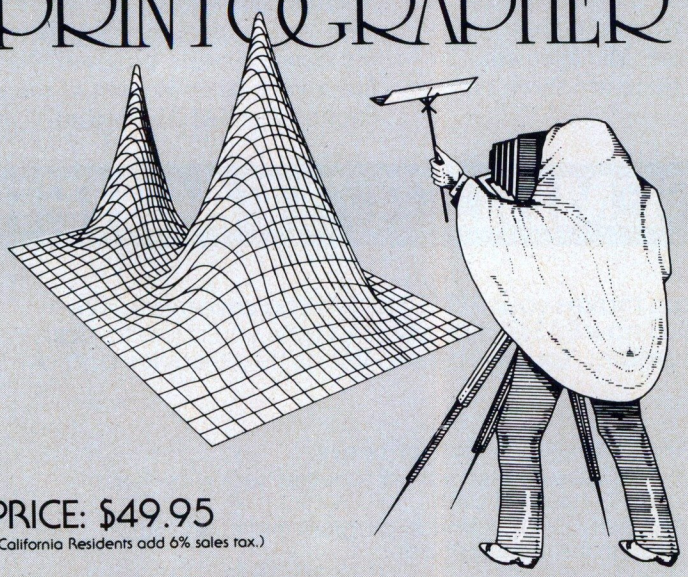

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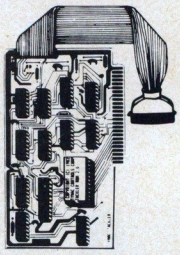

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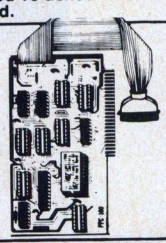

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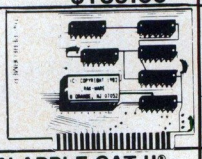

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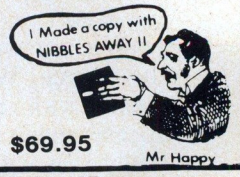

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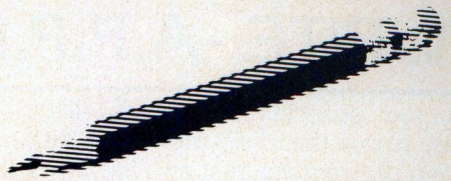

The Readers

Dear Val,

I am writing in connection with B.C. Detterich's fine articles on the EPSON MX100 which appeared in the February and March issues of *Call – A.P.P.L.E.*

I have been using the printer since August 1981 with an EPSON Type II interface card (no.8132) and Smarterm and operate both under DOS and CP/M. There were some problems with the interface board initially but EPSON issued a modified ROM for correcting the difficulties and now all works well.

In connection with CP/M, I have encountered no problems. The attached printout below of samples of different type faces was done with MBASIC.

With reference to Mr. Detterich's chart on page 49 of the February issue, under character types, he shows Normal, Small (or Condensed), Expanded (or Enlarged), and Bold (or Emphasized). I prefer to consider fonts (which Bold is not) and there are five: Normal, Small, Small-Expanded, Expanded, and the fifth which is not mentioned in the Manual (but was in their advance publicity) called Elite. It *is* in the printer and can be called up with ESC "M" and turned off with Ctrl-R, CHR$(18) (just like Small). Its size is between Small and Normal, and I use it all the time. I have written to Epson America about it, but no reply! In any case, it works nicely.

Similarly, the Manual does not mention Double Strike, a vertical down print of the character, called up by ESC "G" and cancelled by ESC "H." It is covered in the MX80 User's Manual by David Lien and works just as nicely in the MX100 (with all five fonts).

Bold or Emphasized, a horizontal double print of the character, works only with Normal or Expanded. If one tries it with Small or Elite, they will default to Normal-Bold. If tried with Small-Expanded, it will default to Expanded-Bold. One can also use Double Strike plus Bold with Normal or Expanded. If tried with the other three fonts, they will default as above but to Double Strike-Bold.

The type II card which I am using also gives graphic dumps of the Hi-Res pages using Ctrl-Q, CHR$(17). The software is built into the ROM's on the card. Further, by POKEing 1912+N (N=slot no.) with the appropriate number, one can obtain normal or inverse, normal size or double size dumps of the two Hi-Res pages either individually or overlaid. In addition, it is possible to obtain a dump of particular lines on the Hi-Res pages, useful if they contain text, carefully explained in the interface manual. By POKEing 1144+N one can obtain dual density (half size) dumps!

There are a number of other nice features which require careful reading of both manuals (printer plus card). The MX100 and MX80 manuals are also quite useful to the CP/M user as many of the routines use MBASIC.

The referenced print out shows the five different fonts and 14 character types available.

James R. Weiner
15 Avenue De La Petite Espinette
B-1180 Brussels, Belgium

Dear Val,

I read with interest the letter from Mr. Harris (July, 1982) regarding the need for modifiable software. Our firm is in the business of writing business for the Apple, and we have been marketing our products for about almost two years. In that time, we have installed almost 2000 systems, mostly inventory control (STOCKPILE) and Point-of-Sale packages. Our packages are written by very experienced (10 to 20 years in the business) professional programmers.

I'd like to make a few comments. We don't copy protect our software (although we did in the first six months), and all our programs are listable and modifiable. However, our Point-of-Sale package is approximately 60,000 lines of assembler and BASIC code, and the programmer's manual (internal use only) is almost 1000 pages long. There are very few REMarks in the BASIC code, and of course none in the machine code. People who talk glibly about modifying something as complex as even the most modest business package are either masochists, or are of such genius that I'd be happy to hire them.

Call-A.P.P.L.E. is a very fine journal! (Normal)
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Call-A.P.P.L.E. is a very fine journal! (Small)
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WRITE -A.P.P.L.E.

In fact, programmers of such talents are so rare that they could name their own price writing their own packages.

I question whether the average user is really interested in modifying his software. What he *is* interested in is getting results. Therefore, the software should be so flexible that *without programming* the user can still configure the program to fit his needs. Our programs allow the user to completely design all reports, invoices, and in fact all output. Field lengths can be user-defined, any sort or sub-sort can be carried out, and in short, the *general* package can be made to do a *specific* task.

I'd really be interested to hear how user-modified software should be supported. I hope no one suggests that any company could support user-written code. We've had users who attempted to modify the software to add another field. This would be rather difficult, especially since I had one "programmer" who called me to say he had proved that we couldn't store 9500 items, each of 63 displayable characters, on three diskettes (wonder what some of our users who *have* 9000+ items thought?). The average business user is not a programming professional, in some cases doesn't even read the *operator's* manual, and does not have to be a computer expert to use our packages. That's just as it should be; you shouldn't have to hire a technician to watch TV.

Yes, we have had bugs in our software, but we don't expect users to fix them. We provide full support, telephone fixes, free updates, and user-dealer newsletters. We even resurrect bad data usually due to faulty hardware. (Why don't they read Appendix D regarding backup?)

Copy protection has never been an issue for our company because of the support we offer. More and more users are starting to realize that support is the most important factor in software purchase. Put simply, we make the software perform to specifications. But, I sure wish every user would read Appendix D!

James P. Harrison, President
Solidus International Corp.
#6 - 144 West 15TH St.
North Vancouver, B.C.
Canada V7N 1R5

Dear Val,

Recently, I made the "shift key modification" to my Apple II so my word processor could use the shift key to generate upper case input like a typewriter. After making that change, I discovered that Pascal 1.1 will recognize the shift key when in the "reverse video mode." This means that one can enter upper case with the shift key in Pascal 1.1 also.

This feature is not mentioned in any of the Pascal 1.1 documentation that I have. The display is still in upper case unless one has installed a lower case chip. I thought the readers who use Pascal might be interested in making the "shift key modification" to their Apple.

Frank C. Pinkston, Jr.
150 De Soto Place
Macon, GA. 31204

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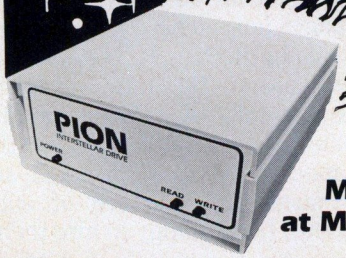

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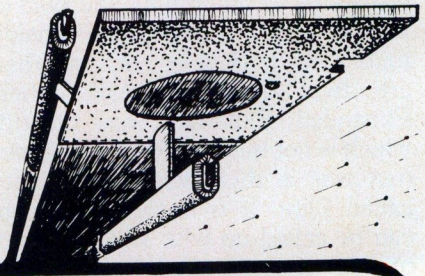

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APPLEMASH:

BUSINESS SOFTWARE

Michael Thyng

Hello again. This month I want to open our discussion with a few comments about the calls I've been getting from you. Many of you have purchased business software and experienced varied degrees of success. Frequently you ask me what software programs or packages I recommend as the "best." There are three problems which make this question impossible to answer.

First of all, there does not exist a "best" program or package which can meet everyone's needs, and be all things to all men. There are, however, some very good programs that, depending upon *your* needs, may be "best" for you. This means that whoever is recommending software to you had better be asking some questions about the nature of your business, the volume of your transactions and what kind and how much historical data you must carry *before* he or she tries to sell you something.

The '80s may be a decade of consumer awareness for many things. We still are going to need to educate a lot of software consumers as to what kinds of things need to be considered before buying. I'm going to the soap box.

Years ago, before it was possible for the common person to actually "own" a computer, a well dressed representative from a relatively large computer manufacturer would come to your place of business and help you determine how large a computer to install.

Perhaps some would say the sales people were just trying to figure out how much you could pay, selling you that size computer. A less cynical, better informed person would tell you that the sales representatives were doing what we now know as systems analysis. (I'll address that in another column).

Basically, they wanted to know how big your business was, in terms of the number of transactions per day, week and month. They also wanted to know how sophisticated an operation you intended to install. Based on your needs, they could sell you the components that you would need to run your operation the way you wanted. They made a number of other discoveries along the way that suggested that you don't simply say one day "I want a computer," and the next day go out and buy one. Some people did just that and their computer systems failed.

When we were buying our computer systems from a major vendor (IBM, Burroughs, CDC, Honeywell, NCR) we were buying through a sales force that pooled within the company its information about selling, keeping track of what worked and what didn't. Major vendors of computers were concerned about every failure of a computer system in a business, seeing this as a reflection on themselves. Whether this is a valid point of view or not, I personally cannot determine.

A related problem, people not being sophisticated enough to distinguish what caused a given system failure, resulted in their equating this unsuccessful attempt with the failure of the computer. The computer company erroneously got the bad publicity for the failure.

Now, however, since virtually every business can afford to own a computer we are experiencing the same problems over again. People still jump in, purchasing a computer system without first making the necessary preparations. There just is not a substitute for taking the time to do a job right. Either you go to school for formal instruction in data processing, systems analysis and computer operations, writing the programs you need, or, you pay someone else to do it. Paying someone else to do it takes the form of hiring a consultant (or employee). Your other option is to buy someone else's program, which must be thoroughly reviewed and found to be suited to your individual business needs. To do the job "right" there are no short cuts.

The second major problem has to do with the quanity of business software on the market. Outlets which carry business software usually cannot carry all programs currently available. Try to think of this factor in terms of your individual business. Could your business, for example, afford to keep an extremely large inventory of products? Some may never sell, some sell only to be returned, and others successfully sell for a profit. Obviously, you choose to carry only products you are convinced will sell to the greatest number of people.

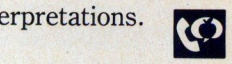
Now as a computer user, what does that tell you? It should at least suggest taking a good hard look at the requirements of your business computer before you go shopping for software. It also implies that you are going to need to go to more than one dealer to see what's available. Listen to your dealer. Chances are good that your dealer knows what he or she is talking about.

In conclusion, I myself cannot give a succinct and universally appropriate answer to your question for one last simple reason. It is virtually impossible for me to review all the business software available. New products flood the market each month. In addition, many dealers do not carry all the programs currently on the market.

Don't give up yet. There is a way that this kind of information can be made available to you. Suppose we create a point of focus for business programs? (For example, yours truly) I could compile those comments and be available to pass on fixes, hints and comments about business software. A similar approach is used by Val on the Hot Line. If there is much response, I can become something of a software recommendation data base. If only a few of you respond, then we can just let the idea die. Here's my address:

Michael Thyng
Business Software Comments
6242 35th N.E.
Seattle, WA 98115

I would prefer having your comments in writing. It leads to fewer errors and misinterpretations.



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PROGRAMS AVAILABLE FOR THE TRS-80, APPLE II, PET & ATARI

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AMPERGRAPH

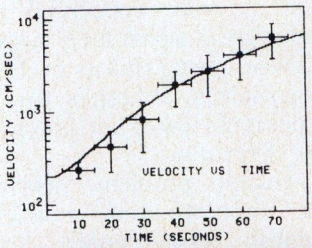
AMPERGRAPH is a powerful, easy-to-use graphics utility for the Apple II Plus. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentype printer) and &*DUMP (to link with AMPERDUMP, see below).

AMPERGRAPH uses the Applesoft ampersand machine language jump vector to link to a relocatable 9K routine which normally resides above the second page of high-resolution graphics in the Apple II Plus.

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
   (CM/SEC)"
20 &LOG Y:&LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
   200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
   (150 + T12)*(.8 + .4*RND(3))
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```



AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which was written specifically to take advantage of the graphics features of the Epson MX-80 and MX-100 printers (MX-80 must have the Graftrax conversion). AMPERDUMP offers many features which are not available in other graphics dump routines:

- Three horizontal magnifications (2.33, 4.66 and 6.99 inches wide)
- Nine vertical magnifications with the MX-80 (0.88, 1.77, 2.64, 3.78, 4.25, 4.45, 5.31, 5.87, and 7.96 inches high); and three vertical magnifications with the MX-100 (2.64, 5.31, and 7.96 inches high)
- Horizontal and vertical magnifications can be specified independently to produce 27 different plot size formats with the MX-80, and 9 different formats with the MX-100
- Normal / Inverse dumps
- Adjustable horizontal tab
- Compatible with AMPERGRAPH
- Fast
- Easy to use
- Relocatable

The AMPERGRAPH and AMPERDUMP graphics utilities require and Apple II Plus (or Apple II with language card) with 48K and DOS 3.3. The AMPERDUMP utility requires and Epson MX-80 with Graftrax, or an MX-100, and one of the following interface cards: Epson, Apple, Grappler, Interactive Structures, or Mountain Computer.

AMPERGRAPH and AMPERDUMP are available from your dealer for $30.00 each, or order direct. Include $1.50 for shipping and handling; Wisconsin residents add 4% sales tax.

madWest SOFTWARE

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A leading developer of software for major publishers, announces for the Apple* – Five disks at $19.00 each.

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Reset lock: program continues if reset key hit, data in tact * Screen Dump: print text to screen, then choose to send it to printer * Input and store comma/colon/etc * Timed input with edit of response: controls keyboard * Build alpha-index name files (no need to sort) * Crunch numbers: store in $, save space, speed up 1/0 * Plus more!

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Hi-res race track and cars. Race against computer car and clock by answering math problems, grades 1-6, add-sub-mult-div, select levels difficulty, response time; file holds user records/stats.

4 - Multi-Drive Copy Program

Runs 1 to 14 drives; 1 minute per copy; includes techniques to modify DOS for turnkey systems.

5 - Keyboard Enhancer

Redefine any or all keys, even as multi-words (c = text/home/catalog); makes files for use in any program with toggle standard/enhanced keyboards; examples (Dvorak, programmer aid) included.

Each disk has full documentation/examples. Each is $19.00 or all 5 for $76.00. Wash. residents add 6.3% sales tax. Send check or money order to:

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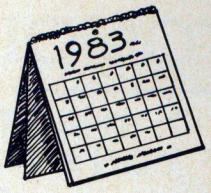

Kevin O. Donohoe/Editor

HARDWARE:

HAYES STACK™ SMARTMODEM 1200

The Hayes Stack™ Smartmodem 1200, a Bell 212A compatible modem that lets RS-232C compatible computers or terminals communicate over telephone lines at 1200 bps.

Like the original Hayes Stack™ Smartmodem for communicating at up to 300 bps, the Smartmodem 1200 also connects directly to the telephone line and an RS-232C port. The Smartmodem 1200 is approved by the FCC for direct connection to any U.S. telephone system for both pulse and Touch-Tone™ dialing. Both types of dialing may be combined in a single command with pulse used, for example, to access a PBX board and Touch-Tone used to dial an outside number.

The Smartmodem 1200 is actually two modems in one; it operates at either 0-300 bps or 1200 bps. It is an intelligent system that executes user commands and responds with either decimal digit or English word result codes. The modem can be controlled by any programming language and it includes all circuitry for auto-dial and auto-answer, thereby eliminating the need for auxiliary equipment and making the Smartmodem 1200 a stand-alone system.

Via an audio monitor, users hear the progress of a call and are alerted to wrong numbers and busy signals. A simple repeat command causes the Smartmodem 1200 to automatically redial a number. Indicator lights on the modem's front panel allow a visual check of its operational status.

Power-on default options are controlled by the position of eight switches, four of which can be overridden by software commands. Options include full or half duplex, enable auto-answer, and result code type. Unique "Set" commands allow selection and change of additional parameters such as dialing speed, escape code character, and number of rings before the modem answers a call.

The Smartmodem 1200 has a Two Year Limited Warranty. Included with the Smartmodem 1200 unit are: a power pack, one modular telephone cable to connect the unit to the telephone and an owner's manual. Suggested retail price is $699.00. Hayes Microcomputer Products Inc., 5835 Peachtree Corners East, Norcross, Georgia 30092, (404) 449-8791.

THE REPEATERRRR™

The REPEATERRRR™ is a unique, high quality printed circuit board providing auto repeat and high speed repeat for Apple II keyboards. These important features found on the Apple /// and standard on most professional terminals. Now anyone with a Rev. 6 (with encoder board) or a later revision Apple II can add these high performance functions. It will also fit earlier Apple II's with updated keyboards. The board plugs into the 25-pin connector between the encoder board and the keyboard. There is no interference, either electronically or spacially, with other Apple accessories. The board draws less than 2.5 mA. and generates virtually no heat.

The auto repeat works for all keypress combinations, including control characters. This is particularly convenient for the various scrolling, rubout, and cursor commands of virtually all word processing and text editing programs. The delay before auto repeat begins can be adjusted or turned off by the delay control.

With auto repeat, the Apple's repeat key would normally become obsolete. Therefore, the REPEATERRRR has an additional feature, ZippKey™, to use Apple's own repeat key to provide a high speed repeat, keyboard selectable. Pressing Apple's repeat key simultaneously with any keypress will approximately double the repeat rate. This saves time whether moving across a line of text or across a VisiCalc spread sheet. The ZippKey feature is invaluable for the longer cursor moves on an 80 column display.

The extensive instructions and diagrams provide full documentation to allow inexperienced users to install the unit with confidence. Only the Apple top needs to be removed to gain access for the plug-in installation. Everything needed is in the package, including a simple installation tool. There is no soldering or modification of the Apple circuitry.

As an introductory offer, the REPEATERRRR, with a one-year warranty and 30 day trial offer, is available by check, VISA, or MasterCard for $19.95 plus $2.00 shipping from High Order Micro Electronics, 17 River Street, Chagrin Falls, Ohio 44022. (216) 247-3110.

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ELECTRONIC SPECIALISTS announce installation of a new Toll Free Interference Control Hot Line. Call 1-800-225-4876 between 9 AM and 4 PM Eastern Time Monday thru Friday to discuss micro computer interference control problems.

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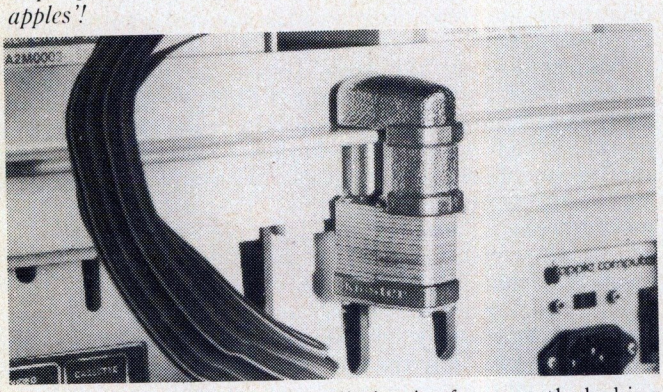

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Price: $145. Multiple orders are discounted. Seagull Enterprises, 11 Cove Avenue, Berkley, Massachusetts 02780.

COMBINATION DIGITAL-VIDEO-MULTIPLEXOR INTERFACES APPLE II COMPUTER TO RGB MONITOR FOR HI-RESOLUTION GRAPHICS AND 80x24 TEXT DISPLAY

A new, low cost Digital Video Multiplexor for interfacing the Apple II computer to an R.G.B. color monitor for high resolution graphics and 80 x 24 text display has just been introduced by Amdek Corp. The Combo - DVM is software color-channel programmable, permitting computer control of the R.G.B. inputs.

Four computer-controlled, multiplexed video channels include: Apple-II 40 character-line text, Apple-II low resolution color graphics, Apple-II high resolution color graphics, 80 character-line text from a vendor board such as the Videx "Video-term", or the Advance Logic's "Smart-term".

The new Combo-DVM board may occupy any slot in the Apple-II computer. Low power consumption is assured with the use of low power Schottky logic.

For futher information, contact: Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, IL 60007. Telephone: (312) 364-1180. TLX 25-4786.

SOSCLOCK /// FOR APPLE ///

SOSCLOCK /// is designed to provide fully SOS compatible clock and calendar functions for the Apple ///. Installation of the SOSCLOCK /// permits the use of all SOS time and date intrinsics as they were originaly intended.

The kit supports the SET time and GET time SOS Utility Management System calls, providing full interface on the operating system level. This allows complete clock and calendar function at the user level without the need for peripheral electronics or user program subroutines.

Apple /// SOS will read the time and date from the SOSCLOCK /// automatically to provide: automatic stamping of volume directories with the current date and time, use of the reserved variables TIME$ and DATE$ in Apple /// Business Basic, use of the Procedures Date, TIMEOFDAY and SETTIME in Apple /// Pascal, and full implementation of the system calls SET TIME and GET TIME.

SOSCLOCK /// is a complete kit containing a clock/calendar IC, backup battery assembly and a comprehensive owner's handbook, the IC mounts in a socket provided on the Apple /// motherboard. The battery case mounts just under the Apple /// top cover, allowing easy user access for battery replacement.

Developed by an energy management company for their own OEM use, SOSCLOCK /// is now available at $60 from System Fabricators, 736 Hermosa Avenue, Hermosa Beach, CA 90254, Tel. 213-372-6273.

SOFTWARE:

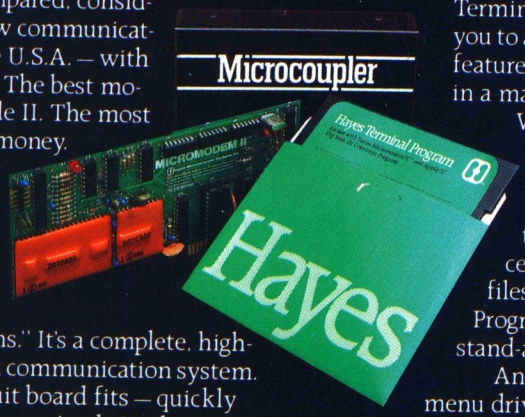
APPLE PREVIEWS APPLE /// COBOL AT NCC

COBOL (COmmon Business Oriented Language) is the most widely used programming language for commercial and administrative data processing applications. Apple /// COBOL is a full-featured implementation including the most frequently used modules. Apple /// COBOL has been certified by the Federal Compiler Testing Center at the High-Intermediate level.

While maintaining compatibility with mainframe COBOL applications, Apple /// COBOL contains language extensions specifically oriented towards the personal computer environment. The Animator Option allows one to conveniently debug programs at the source level — giving the programmer complete control while actually watching a program's execution on the monitor screen. FORMS-2 is a COBOL source-code generator which lets the program developer start from a blank screen and end with a fully operational COBOL program.

Apple /// COBOL provides the following user benefits: permits one to compile and run COBOL programs having mainframe sophistication, allows one to develop a wide range of business applications in the convenience of the Apple /// personal computer environment, provides access to the largest base of existing programs and standard data processing applications available, greatly improves debugging activities by providing an "animated" view of actual program execution, and shortens program development time by providing interactive screen creation.

More Apple II owners choose Hayes Micromodem II than any other modem in the world. Compare these features before you buy. You should. It's your money. Thousands of other Apple II owners have already compared, considered, and are now communicating – all over the U.S.A. – with Micromodem II. The best modem for the Apple II. The most modem for your money.



A complete data communication system. Micromodem II is not "base priced" plus necessary "options." It's a complete, high-performance data communication system. The printed circuit board fits – quickly and easily – into your Apple II, eliminating the need for a serial interface card. And the Microcoupler™ (included) connects the Apple II directly to a standard modular telephone jack. Auto-dial and -answer features are built-in. Operation can be full or half duplex, with a transmission rate of 300 bps. And it's Bell 103 compatible and FCC approved.

Now there's Hayes Terminal Program, too! Developed by Hayes specifically for Micromodem II, this new Terminal Program allows you to access all the great features of your modem in a matter of seconds. With it, you can use your CP/M,® DOS 3.3 or Pascal formatted diskettes to create, send, receive, list and delete files. Hayes Terminal Program is a complete, stand-alone disk.

And because it's menu driven, you can choose from a wide variety of options to set your communication parameters – as well as change hardware configuration – directly from the keyboard. It even allows you to generate ASCII characters that are normally not available from Apple keyboards, further extending your capabilities. Incoming data can be printed (on serial or parallel printers) as it's displayed on your screen.

Software sold with Micromodem II or separately. A Terminal Program disk and user manual now come with Micromodem II; or, if you already have one, you can buy the Terminal Program separately.

If you're ready to communicate with other computers, to access information utilities, timesharing systems, or use bulletin boards, then you're ready for Micromodem II. Come on. Compare. Consider.

Micromodem II is already the best-selling modem for the Apple II. Now, with Hayes' new Terminal Program, it's better than ever.

Hayes™

Don't settle for anything less. Available at computer stores all across America.

Hayes Microcomputer Products, Inc.
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Norcross, Georgia 30092 (404) 449-8791

Your Apple® II just isn't the same without Hayes Micromodem II.™

NEW! Terminal Program from Hayes!

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TOMORROW'S APPLES TODAY

Apple /// COBOL will start shipping to authorized Apple dealers this Fall. Full product specifications, ordering information, and pricing will be announced prior to that time.

AIR NAVIGATION TRAINER

AIR NAVIGATION TRAINER (ANT) is a navigation simulator for an APPLE II+™ computer (48K, DOS 3.3). ANT will eliminate many of the mysteries of air navigation for the student pilot, as well as improve the instrument training of experienced pilots. At all times (if desired) it is possible to view the ground track that results from actions taken in the cockpit. Experienced pilots can practice holding patterns on a VOR or NDB fix (or interaction) while viewing the effects of the wind (adjustable with paddles) on the ground track. Four pre-programmed simulations and a VOR Demo program are also included. All this and much more for a tiny fraction of the cost of equivalent flight time.

ANT features: High Resolution Graphics, Sound Effects (Includes Station ID's), 6 VOR's (VHF Omnirange Radar), 2 VOR Receivers (adjustable OBS), 2 NDB's (Non-Directional Beacon), 1 ADF (Automatic Direction Finder), 4 Different Simulations & VOR Demo, Ground Track Map (Adjustable Scale), Constant Or Variable Wind Selection, Wind Magnitude & Direction Adjust, Resettable Elapsed Time Indicator, Can Be Flown Real-Time Or Faster, Full Documentation, and Much, Much More.

Price: $40. Space-Time Associates, 20-39 Country Club Drive, Manchester, N.H. 03102, (603) 625-1094.

NEW MACRO CROSS-ASSEMBLERS FOR THE APPLE II

S-C Software Corporation announces three new macro cross-assemblers for the Apple II. Now you can easily develop programs for Z-80, 6800, and 6809 computers, using all the familiar features of your Apple and all the famous power and convenience of the S-C Macro Assembler.

With the power of macros, conditional assembly, 20 directives (pseudo-ops), and 29 commands (including a powerful EDIT command with 15 subcommands), entry and modification of source programs is even easier than BASIC!

Each of the S-C Macro Cross-Assemblers is priced at $110. Registered owners of the S-C Macro Assembler may purchase the Cross-Assembler modules for $32.50 each.

Available from S-C Software Corporation, P.O. Box 280300, 2331 Gus Thomasson, Suite 125, Dallas, TX 75228. Phone: (214) 324-2050.

FILMTAPE

FILMTAPE (V2.0) is a powerful new edit decision list manager and film 'frame number cruncher' that can make video conforming of raw scenes to a cut workprint a snap — saving so much time in the video edit that it can pay for itself many times over.

Just released after extensive field testing, FILMTAPE translates edit address information from feet + frame (or just frames) into television time codes. It works with a cut workprint and up to four original scenes rolls at once, giving frame accurate results, even with a mix of 35/16 mm film; drop/non-drop time codes; print or negative transfers on any transfer system.

FILMTAPE is also useful for keeping cue sheets for animation or mixing, and aids in entering light-change information for computerized film-to-tape transfers.

FILMTAPE is available now for Apple II+ with 48K, printer, and DOS 3.3. Call or write for more information: Jim Mack, Editing Services, 615 Fairground, Plymouth, Mich. 48170. (313) 459-4618. Price: $395.00 until Dec. 31, 1982.

DISKOVERY

Micro Mantic Computer (541 N.E. McWilliams Rd., Bremerton, WA 98310; 206-373-9231) is introducing DISKOVERY, an Apple disk utility package with something for everyone. The only disk utility package that supports 35, 40, 70, and 80 track drives in 13 and 16 sector formats, including CP/M and PASCAL. DISKOVERY includes several programs for repairing damaged diskettes, undeleting files, testing the drive speed, etc. etc. etc. Designed to grow with your computer system, with free updates guaranteed for 5 years. Several new programs are presently being developed for DISKOVERY and will be included in the next free update. The computer software is supplied on a non-protected diskette in both 13 and 16 sector formats for the customer's convenience. A comprehensive manual, with over 130 pages, in an attractive 3-ring binder rounds out the package. A bargain at $59.95.

INTEGER BASIC COMPILER

Synergistic Software announces the release of the Integer BASIC Compiler by Christopher Galfo, a utility software program for the Apple II computer with Integer BASIC. This new compiler offers machine language speed and flexibility for the novice and experienced programmer alike. The Integer BASIC Compiler (IBC) runs up to ten times faster than other compiled programs and is more compact (memory saving) than any other compiler on the market. Standard features include full support of high-res and low-res graphics and full support of lower case characters, disk error recovery, CHR$, GET, and KEY functions. The IBC has a relocatable run-time system, spots and flags program errors, and compiles code at about 50 lines per second.

Any programmer unexcited about Applesoft compilers should investigate the IBC. Its internal design is based on advanced computer science principles, but it is documented so that even a novice programmer can exploit its power. Programs written in Integer and compiled with the IBC can run on an Apple without Integer. With its extended string handling, hyper-speed arithmetic, and complete compatibility with DOS 3.3, the IBC is invaluable to Integer programmers.

The IBC requires an Apple II computer, 48K, DOS 3.3, and one disk drive to operate. Cost is $149.95. Synergistic Software, 830 North Riverside Drive, Suite 201, Renton, WA 98055. Telephone (206) 226-3216.

ENHANCEMENT TO THE MILL™

MSM is a enhancement to the THE MILL™ Assembler Development Kit that combines the features of ASM09, ASM09I0.BIN, and LOAD09 all into one 6502 machine language program! Merging MSM with ASM09.BIN creates MSM09 — a stand-alone BRUNable 6809 assembler offering these additional features: Faster disk I/O, TEXT or BINARY object files, Perfectly formatted listings, CTRL-S suspends assembly, CTRL-C aborts assembly, AUTOSTART ROM not required, Supports 80 column cards.

Included on the MSM diskette: DOS — The DOS 3.3 HELLO program with helpful information; MSM — The 6809/6502 assembler interface code; MUT — A utility for converting existing TEXT record object files to directly executable BINARY files; SETUP — A one time configuration program that merges MSM with ASM09. BIN.

System requirement: 48K APPLE II or APPLE II PLUS with DOS 3.3; THE MILL 6809 Coprocessor Board; THE MILL Assembler Development Kit.

Optional: A printer, and an 80 column card.

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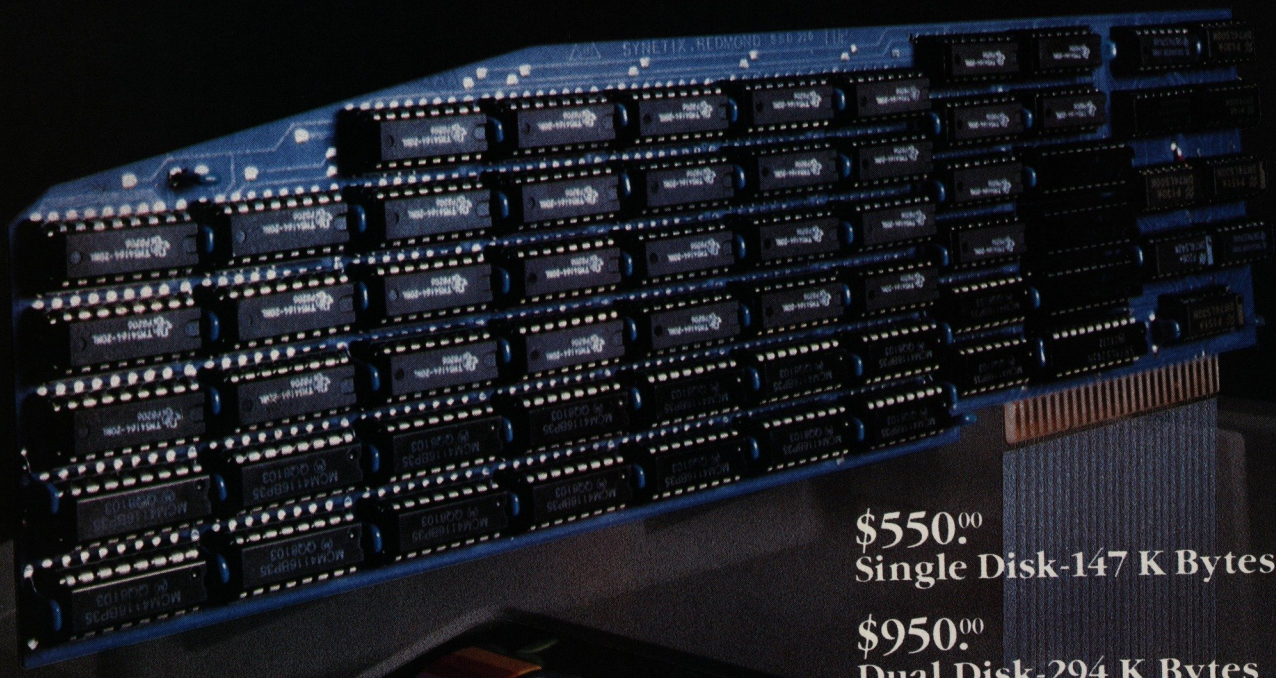

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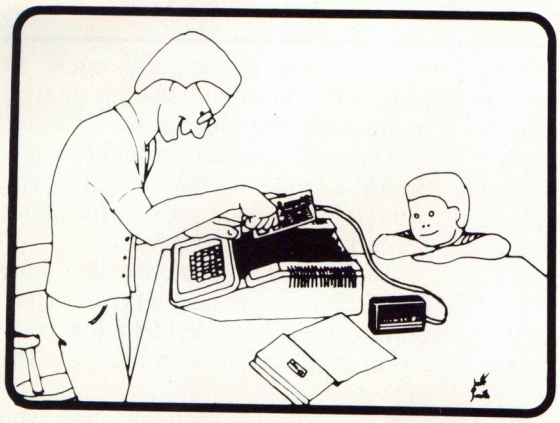

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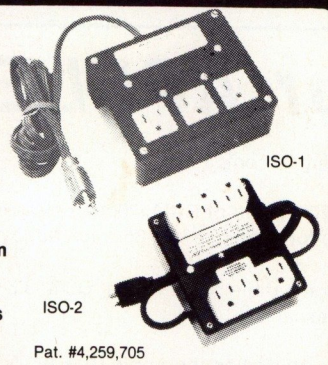

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Michael Thyng

ON the weekend of June 5th and 6th, over thirty Apple][and /// owners met at the Pacific Science Center to meet with the general public and talk with them about Apple Computers. Turnout on the part of the public was a little light, probably only about 3000. However, the computer participants had such a great time talking to each other about how they were using their Apples, that the small crowds were appreciated.

Rich Thayer made quite an impression on a lot of us. He demonstrated how ridiculously easy it is to interface switch devices to the Apple via the game port. He told of how some handicapped people with Cerebral Palsy have been able to communicate more clearly with the non-handicapped world with Apple Computers. I think there is a big potential in this area for a special committee to work on a community service project to help the handicapped.

Terry Dahl went to the trouble of arranging for us to have a big screen TV. Sub-Logic's flight simulator is really impressive on the big screen.

Howard Hayes brought his short wave radio in and talked to people as far away as Bellingham. We had some visitors from Vancouver B.C. and Salt Lake City. Maybe Howard had more influence than I thought.

Bill Crouch came up from Oregon and demonstrated "Window." Window is a new computer magazine — *on disk.* Watch for a review. I have a copy of the first issue.

Duane Wilson and Norma Hart showed how they use their Apples to "play the market".

Carl Main brought in a bunch of audio equipment to show how he teaches Music Theory students the physics of sound. Terrific demonstration.

Lisa and Michael Storrie-Lombardi brought in two Apple]['s to show how a computer could be used to do clinical psychiatric preliminary examinations.

Doug Rasmussen brought a new Smith Corona "daisy wheel" type printer. He is selling them for about $895. I like the characters.

Dick Turner demonstrated how the IC chips, so important to our computers, are made. He had a low resolution graphics show to illustrate the process.

Don Purvis brought, are you ready for this, a black (Bell and Howell) Apple][! Now that definitely raised a lot of eyebrows. I'm leaving out the majority of the participants, including Norma John who teaches assembler classes in Oregon using Big Mac. Alas, there were no robots. Inventors, if you feel that you missed something by not attending, you did. But you missed far more by not participating. Next year you'll have another opportunity. Don't say I didn't warn you.

Supercharge Your APPLE II*

The Axlon RAMDISK™ 320K Memory System for the Apple II and Apple II Plus* provides access speeds never before available. The Axlon memory system is designed to interact with Apple DOS 3.3* and Apple Pascal 1.1* like two standard floppy disk drives while delivering the lightning fast access speeds of RAM memory. This also leaves 32K of RAM for advanced programming techniques. The interface board is slot independent and draws no power from your Apple. The rechargeable battery system built into the unit provides three hours of backup in the event of a power loss. Drop by your local Apple dealer or contact Axlon, Inc. for more information.

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NOTICE TO FOREIGN MEMBERS:
A.P.P.L.E. Hardware products not available to overseas or foreign members. This includes Ap.Drive & Ap Cool Kit.

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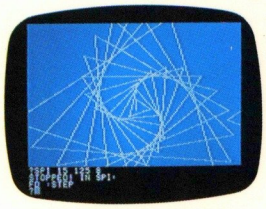

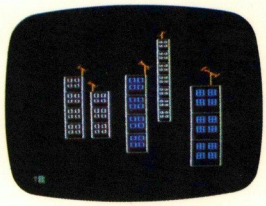

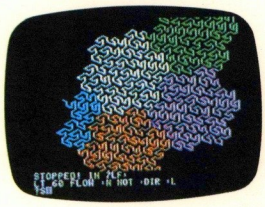

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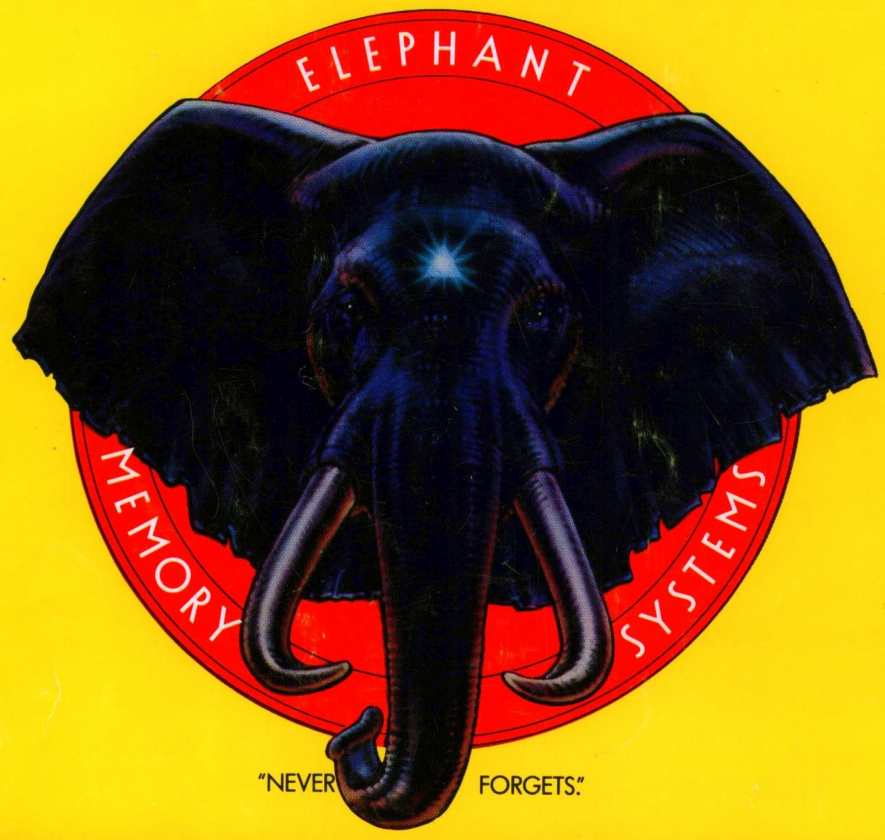

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